Research on Industrial Product Model Design Based on Computer Software

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Abstract. The design of industrial product model based on computer software can effectively pre verify the batch of products and subsequent use experience, so as to reduce the design and manufacturing cycle of industrial products and reduce the cost of change, so it has important research value. Based on this, this paper first analyses the function and value of industrial product model design, then studies the key points of industrial product model design based on computer software, and finally gives the implementation strategy of industrial product model design based on computer software.

Keywords: Industrial Product, Model Design, Computer Software

1. Introduction

With the iterative progress and maturity of computer tech, it has been widely studied and popularized in many fields, especially the application of intelligent devices represented by computer software in the field of industrial product model design, which greatly accelerates the amelioration of the level and efficiency of industrial product model design [1]. Through computer software to achieve human-computer interaction in industrial product design engineering, to achieve the effective transmission of data, ameliorate the info perception ability of the design process [2]. In the process of industrial product design, in order to meet the requirements of industrial processing, the form of industrial products will be calibrated, and a complete industrial product design scheme will be formulated, so as to meet the production and process requirements of industrial products. Draw support from computer software to enhance the human-computer interaction in the process of industrial product model design, the production data of industrial products can be efficiently transmitted and fed back. Therefore, the industrial product design model is constructed to pre verify the subsequent links, so as to enhance the reliability of industrial products in the subsequent links.
As an important means to analyze and verify the appearance and function of industrial product design, the construction of industrial product model can not only evaluate the experience of its use process, but also effectively control the design quality of industrial products [3]. Therefore, the design of industrial product model based on computer software can effectively pre verify the batch of products and the subsequent use experience, thus reducing the design and manufacturing cycle of industrial products, reducing the cost of changes and improving the physical test of consumers in the process of use.

In addition, due to the typical characteristics of industrial product design as shown in Figure 1 below, in the process of computer software aided design, we need to pay attention to the clarity of design process objectives and establish fixed design rules. Computer software aided industrial product model design needs to pay attention to product modeling, provide product design in line with consumers' cognition and thinking, realize effective mining of industrial product design requirements, and establish the organic unity of design requirements and system modeling [4]. Draw support from the application of computer software in industrial product design model, the expressiveness of industrial product info and knowledge is ameliorated, and a reasonable domain model is established to realize the organic integration of industrial product design process and computer software.

![Figure 1. Typical characteristics of industrial product design process](image)

In a word, industrial product design integrates design, aesthetics, info science and many other disciplines and majors. With the increasing diversification and personalization of consumer demand, industrial product design also needs to be adjusted and optimized in time according to the changing demand trend of the market. Draw support from computer software aided industrial product design process, it can stimulate and release the creative thinking of designers, ameliorate the efficiency and accuracy of industrial product model design, and optimize the feasibility in product manufacturing and process. Therefore, the research of industrial product model design based on computer software has important engineering practice value.

2. The function and value of model design of industrial products

2.1. The necessity of building industrial product design model

With the deepening application of computer software and hardware in industrial production, for the manufacturing process of industrial products, the info processing from design to production requires a unified product model, so as to ameliorate the efficiency of industrial product design and process
planning. Secondly, the computer automation equipment cannot work in the absence of industrial product model info. In addition, in the geometric modeling of industrial products, product models contain geometric and topological info, which can be imported into the process of engineering analysis, drawing and NC programming, which can greatly ameliorate the work efficiency of designers [5]. With the iterative maturity of intelligent and integrated tech, the industrial product model under AI manufacturing environment has become the trend of application, which also requires the design of industrial product model based on computer software.

Industrial product model requires the computer to understand the definition of product in the model, and apply AI software tech to the process of info generation, management and utilization of product model. As an important part of industrial design process, product model design is also an important tool to express designer's creativity, which provides a powerful means for product face-to-face design and product 3D modeling.

2.2. The function of model in industrial product design

In the design of industrial products, the model can first record the conception, and show the shape, structure, color and material of products from multiple levels. By making straw mould with materials easy to be processed and formed, the idea of design is recorded, so that the ideas generated in the mind at the initial stage of design can be clarified. Secondly, it can construct the research form and study the design conception with the entity representation method of the model [6]. In addition, it can also analyze the product structure, such as the modeling structure of form design, the connection and transition of basic form, the arrangement of product functional components, the coordination relationship between motion construction, etc. Draw support from industrial product model design, we can constantly correct the visual differences between drawings and objects, further ameliorate the design concept, adjust the design scheme, and verify its rationality. Draw support from the model in industrial product design, the relationship between product modeling and human-computer adaptability and operability can be established, so as to obtain better human-computer interaction experience.

2.3. Classification of models in industrial product design

According to its application, the model can be divided into research, display, and function and prototype model [7]. Among them, the research model is mainly used for the important means of self-study and conception of industrial product designers in the early stage of design, so as to determine the basic form, structure and key proportion relationship of the products. At the display level, the model mainly confirms and verifies the product form after the design scheme is determined. In addition, at the functional level, the model is mainly used to test and verify the design performance of industrial products, including human-computer interaction performance, utility and rationality of functional structure, so as to verify whether the products meet the design requirements.

3. Industrial product model design based on computer software

3.1. Constraints of industrial product model design
The manufacturing process of industrial products is composed of many different stages, and the common effect and influence on the cost, quality and production efficiency of products. In the manufacturing process of industrial products, these different processes restrict each other and build a complex relationship network [8]. Because the computer plays an important role in the info processing and process control of manufacturing system, it is necessary to carry out info processing in the process of industrial product design, that is, to realize the constraint solution of product abstract model. Based on the constraint language and system, a unified product model framework is established, and the key design parameters of the product are expressed in the form of constraints, as shown in Figure 2 below.

![Figure 2. Constraint representation of key design parameters of product model](image)

3.2. Characterization of industrial product model design

Features can represent the shape and technical attributes related to manufacturing, or they are part of geometric and topological elements. Industrial product models should be able to explicitly provide features of interest to the application. The feature is extracted interactively from the geometric model of industrial products and input into the computer software system, but this process is not suitable for automatic manufacturing [9]. Secondly, it can automatically extract features from the geometric model, including the key parameters of features. In addition, the fuzziness of feature classification and the problem of feature definition need to be solved when developing feature-based design. Feature extraction is used to describe the info exchange between the industrial product model and the outside world, including feature extraction for shape and industrial planning.

After the manufacturing system obtains the user's requirements for the product, it carries out the function, concept and detailed design of the product, optimizes the product iteratively, and provides the utilization of the info of industrial product production, process and manufacturing process. The model framework process is shown in Figure 3 below.
4. Implementation of industrial product model design based on computer software

4.1. Design method of industrial product model based on computer software

In the process of creating the form of industrial products, industrial design should adapt to various technologies and functions, and realize the effective cooperation between the design process and the manufacturing process [10]. Draw support from computer software, the creativity of designers can be released effectively. Through the separation of size and shape constraints of industrial product model, more flexible full constraint construction can be realized. Secondly, using computer software to edit and modify the features of industrial products, the design process of industrial products can be displayed directly. In addition, draw support from computer software, the forward reasoning design method of product model is constructed to realize the expression of design knowledge and the application of reasoning tech.

4.2. Utilization of big data visualization in dance teaching in primary and secondary schools

The design and implementation of industrial product model based on computer software includes the implementation of logic layer, application layer and data layer. In the logic layer, the task structure, task info expression and task object organization are classified according to the product design task model. Secondly, at the implementation level of the application layer, determine the style, structure, icon graphics and function module page of the system interface. According to the requirements of system interface style and page structure, the user interface and usability info are designed and supplemented to guide the page design and implementation of each functional module. In addition, in the implementation level of the data layer, the data organization of the database ameliorates the security and stability of the system through the storage, processing and query of metadata, and realizes the storage and processing of data generated in the design of industrial product model.

5. Conclusion

In summary, draw support from the application of computer software in industrial product design model, the expressiveness of industrial product info and knowledge is ameliorated, and a reasonable domain model is established to realize the organic integration of industrial product design process and computer software. This paper studies the function and value of model design of industrial products, and analyzes the classification of models in industrial product design. Through the analysis of
industrial product model design based on computer software, the characterization of industrial product model design is studied. Through the research on the design and implementation of industrial product model based on computer software, the design method and implementation strategy of industrial product model based on computer software are analyzed.

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