Research on the Specific Application of Computer Aided Technology to Product Packaging Design

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Abstract. With the development of science and technology, computer technology can be seen everywhere in our daily life. Of course, the rise of computer technology has played a very important role in the development of various industries. This article mainly analyzes the specific application of computer-aided technology in product design.

Keywords: Computer-aided Technology, Product Design, Application

1. Introduction

Packaging design means that the staff should choose suitable packaging materials and use clever craftsmanship to carry out container structure modeling and packaging beautification decoration design for the goods. There are two main functions of packaging design. The first is to protect the product, and the second is to beautify and promote the product. The packaging not only makes the product have a safe and beautiful coat, but also becomes a powerful marketing tool [1].

2. The role of computer virtual technology in product packaging design

Virtual technology is the application of a computer to generate a simulated environment, also known as a virtual environment, which enables users to invest in the environment through various sensing devices, and realizes the direct interaction between the user and the environment. Virtual technology mainly uses computer technology, simulation technology, artificial intelligence, sensor technology, and network parallel processing technologies to transform two-dimensional design to three-dimensional design, and geometric model to virtual product model, so as to effectively solve those reflected in time cost, quality, etc. Aspects of the problem.

Product packaging is the specific language of design expression and the visual communication of design. Product packaging design is a comprehensive plan and shape design work, which often includes the visual communication form and structure of product packaging. The overall effect and engineering
design, design concept is often completed in the continuous adjustment and change between the plane and the three-dimensional back and forth. The use of virtual technology expands the cognitive means and fields of human beings [2]. It is not only a presentation medium, but also a design tool, which produces a humanized multi-dimensional information space in a visual form. Application of virtual technology for packaging design, its advantages and functions are mainly reflected in the following aspects:

(1) The design is convenient and intuitive, has a strong sense of reality, and is simple to change and modify. The serial design is very convenient.

(2) The design expression is easier, the performance quality is higher, and it can be controlled arbitrarily, and the interactive performance is good.

(3) To ensure intercommunication and collaboration, designers can collaborate more closely.

(4) The design cycle is short, the production cost is low, and the design efficiency is high.

(5) The file is small, the publishing format is diverse, and the information transmission is extremely fast [3].

3. Product packaging design process analysis

In the product packaging design, the scientific and rigorous process arrangement is to establish the product; the important guarantee of the brand image, Figure 1 shows the specific steps of the packaging design in the form of a flowchart.

![Product packaging design process diagram](image_url)

**Figure 1.** Product packaging design process

3.1. Research and analysis

The packaging design of products is often for various reasons. Or to launch a brand new product, or to improve its packaging design for the replacement of the original product, regardless of the motivation, it is essential to fully understand the needs of consumers, which requires the design team of this project, and the market Have some knowledge. Therefore, before designing, it is necessary to go deep into the company, understand its business strategy and conduct market analysis, so that the designer can fully
consider the object and application environment that the product will contact according to the internal nature, industry category and business philosophy of the company, and set standards for the company Standard product packaging design [4].

Traditional survey methods mostly use telephone interviews or direct questionnaires, which are poorly targeted and slow, and the information sources are not extensive. The combination of virtual technology to conduct market research through the Internet can increase the interest of the interviewee. The information obtained is also richer, more accurate and targeted.

3.2. Packaging creativity

Packaging design is a systematic engineering, involving many disciplines. The most important one is creative strategy. The innovation of packaging design must adapt to the market and actively develop the market. After communicating with the company and conducting preliminary research and analysis, the designer sorts out all the materials, forms certain opinions and ideas, and submits them to the account manager or planning manager for discussion. When everyone has reached a consensus on the strategy and ideas, they will be sorted out and formed into a copy. Based on the analysis of the survey results, the designer extracts the structure type and color orientation of the product packaging design, digs out relevant graphic elements, and finds out the design direction. Subsequently, several interactions with customers were conducted, and after the two parties reached a consensus, they formally began to perform creative expressions [5].

3.3. Conceptual design

Conceptual design is a key link in the packaging design process, which is to transform certain requirements and creative ideas into executable design guidelines and obtain the early prototype of product packaging after completing the design requirements analysis and preliminary packaging ideas. The conceptual design process is a series of orderly, organizable and goal-oriented design activities. It is manifested as a process from rough to precise, from vague to clear. From abstract to concrete, it is also the most effective in the product design process. The stage of value.

3.4. Detailed design

In the detailed design stage of product packaging, the technical parameters determined in the conceptual design stage of the product are further specified, and the production requirements, processing accuracy and process flow are determined. Product innovation and its competitive ability are basically determined at this design stage. Specifically, first determine the basic style of packaging and plan the product series; secondly, analyze the product transportation and storage conditions, product price, content weight, and product’s special requirements for packaging, and determine the packaging material packaging method and packaging grade accordingly; finally, according to the packaging Material product characteristics, content weight and quantity, structure design, and proofing experiment to determine the rationality of the detailed design of product packaging [6].

3.5. Scheme decision

After the detailed design is completed, it enters the plan decision-making stage, the feasibility demonstration of the plan proposed in the previous stage, the design evaluation and modification of the
plan, and finally, the engineering design of the design draft to determine the structure size and process. If problems are found, return in time. In the previous stage, the design process will be revised and improved, and gradually optimized, to coordinate the complex relationship of packaging design in appearance, color details, features, and functions, so that the packaging design is more operable. At the same time, performance evaluation must be carried out in the plan decision-making stage, which is the key to determining whether the product packaging is reasonable and whether it can be marketed.

3.6. Digital modeling

After the product packaging design plan is determined, the digital modeling of the product needs to be carried out. This process will make full use of the relevant means provided by the virtual technology to carry out the 3D modeling.

Using the three-dimensional environment provided by virtual technology, designers can directly obtain model information through intuitive visualization graphics and images, design in the virtual environment, and modify the digital model to improve modeling accuracy. Using digital modeling technology, designers can fully immerse themselves in the virtual environment, give full play to their imagination and creativity, and interact and operate with product models at a high level that is close to real products, and the product design results can be carried out without using physical prototypes. Multi-angle, all-round analysis and verification [7].

In each stage of product packaging design in Figure 1, virtual technology plays a very important role. Through the advanced design methods provided by virtual technology and the ever-expanding network advantages, each link of product packaging design can be carried out efficiently and smoothly, and the feedback between each step is convenient and quick, so that the performance of the product can be coordinated and optimized to a certain extent. According to the principle of product comprehensive performance optimization, the final plan can be determined, and then implemented through digital modeling methods, so that the developed product can achieve the best performance combination pursued by the designer.

4. Packaging design system structure based on virtual technology

4.1. Proposal of the system

Packaging design is an integrated design with strategic characteristics. It is the crystallization of teamwork. It is not a single job. It is a process of participation and integration of more other departments. A packaging project requires multiple people to collaborate and complete the packaging design. Each process requires communication between designers, close cooperation with personnel responsible for production and sales, and full use of the advantages of virtual technology to continuously improve the level of product packaging design. According to the actual characteristics of product packaging design, this paper proposes a distributed packaging design system based on virtual technology. Specifically, it means that based on the rich information provided by the network, it makes full use of emerging virtual technologies to allow designers located in different locations to work, communicate, and share information on the packaging design of the same product in a timely manner enjoy [8].

4.2. Analysis of the system's hierarchical structure
In order to ensure the safety and efficiency of the system, the distributed packaging design system based on virtual technology adopts the three-tier architecture shown in Figure 2, which is composed of three parts: the customer layer, the middle layer and the database layer.

![Figure 2. The architecture of the virtual design system](image)

The customer layer provides users with a unified collaborative design environment, so that designers can easily perform expected functional operations.

The middle layer is the packaging design control center, which is the core and foundation of the system. It is mainly composed of the collaborative design control center and the virtual design service center. The collaborative design control center is responsible for the initiation and termination of collaborative activities, task decomposition, process monitoring, resource management and overall maintenance of a series of activities in packaging design.

The system emphasizes the team work style and work spirit of the designers, and all designs of the product. The personnel form several working groups, work together, and review all aspects of the designed product at any time, and strive to make the designed product meet the customer demand. The
Virtual Design Service Center provides software platforms and related demonstration tools for virtual product design, including CAX tools, simulation tools, management tools, etc. In order to form an integrated and collaborative development environment, various tools need to be integrated to form the function, information and process integration between tools [9]. The use of related tools enables designers to immerse themselves in the computer-generated three-dimensional virtual environment, transform product design from physical state to virtual state, from physical design to non-physical design, and from tangible design to intangible design. Complete various simulation controls in packaging design. The data layer provides a database of packaging products, and uses a product data management system (PDM) to manage these data to ensure the integrity, uniformity, and version correctness of the data at any time [10].

5. Conclusion

With the development of computer virtual technology, the advantages of virtual technology meet the needs of packaging structure, style and form. Virtual technology has greatly promoted the development of product packaging design industry. With the gradual deepening of virtual technology research, product packaging design will also have a broader prospect.

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