

Innovative Design of Furniture Modeling Based on Machine Vision

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Abstract

With the constant change of social consumption concept, factors such as product innovation, artistic appearance, amenity and environmental protection have been paid more and more attention, and they occupy a prominent position in market competition. People's artistic ideas, life attitudes and aesthetic concepts are constantly improving, and modern art is no longer just a symbolic meaning but an expression of ideas. In addition to satisfying the material functions used by users, the spiritual functions of design objects become more and more prominent, which determines that one of the main trends of product design development is humanization of design. Based on machine vision, this paper analyzes the elements of furniture modeling design, points, lines, surfaces and other elements of furniture. Then, it introduces the color and texture and surface decoration of furniture which have great influence on the visual effect of furniture appearance. Finally, it summarizes and analyzes the practical furniture modeling design methods, and further promotes the development and innovation of furniture design.

Keywords: Furniture modeling design, Machine vision, Innovate

I . Introduction

With the development of China's furniture industry, the furniture industry has put forward higher requirements for itself in terms of product quality and industrial technology level [1]. Under the background of the internationalization of people's work style and life style, and the homogenization of furniture manufacturing technology, how to enhance the unique charm of furniture through design innovation, so as to enhance the market competitiveness of furniture brand, is a hot research topic for domestic and foreign furniture industry workers. With the continuous change of social consumption concept, more and more attention has been paid to such factors as product innovation, artistic appearance, amenity and environmental protection, which occupy a prominent position in the market competition [2]. With the rapid development of modern science and technology in China, materials are updated more and more quickly, and the selection range of materials is also more extensive [3]. With the continuous improvement of people's artistic concept, life attitude and aesthetic concept, modern art is no longer just a symbol, but an expression of concept. In the production of furniture, the processing of workpieces that meet the accuracy requirements plays an important role in ensuring the interchangeability of parts and improving the quality of the final product [4]. Modern furniture products have more and more attributes of industrial products, and furniture design has more and more characteristics of general product design. Furniture modeling design is to analyze and study the appearance, texture, color decoration and other design elements of furniture, so as to create a novel and unique furniture image to meet the needs of users [5].

Design thinking is the motive force for the progress and development of human beings and human society. It is the foundation of design and the source of modern furniture design. Human beings have been engaged in innovative design activities for a long time, and the continuous expansion of design thinking has accumulated rich design methods and experience [6]. In furniture design, every designer, based on his own understanding of art, uses the general rules and methods of modeling to comprehensively deal with the form, structure, material, technology, color and texture of furniture, and creates a perfect furniture modeling image [7]. Furniture modeling design requires us not only to master the general modeling design methods, but also to be familiar with the various elements of furniture modeling [8]. Function utility, material technology and form aesthetic feeling are the principles of furniture modeling design. In modern furniture design, we should make full use of the method of modeling design, bring forth the new, and design a new image of furniture that can bring people new life

experience and higher quality of life, so as to stimulate consumption and further occupy a larger market [9]. Based on machine vision technology, when we design furniture modeling, we should first consider the elements such as point, line and surface in furniture modeling design, combined with the impact of color, texture and surface decoration on the visual effect of furniture appearance, and use modern technical methods to innovate the modeling of furniture, so as to meet the aesthetic and needs of modern people.

II. Comprehensive Material Art and Furniture Modeling Design

Different from multimedia art, the creation of comprehensive materials does not mix elements out of vision, but is mainly based on visual effects. The art of comprehensive materials is a form of expression in which artists, by knowing and mastering the attributes of Dolly's materials, use them as a medium to make materials and works of art better integrated and possess unique texture and texture, thus breaking the traditional works of art. When the designer purposefully carries out furniture modeling design, various forms in memory will appear in the process of design thinking. These basic forms can be divided into natural form, artificial form and geometric form [10]. Comprehensive material art is a very creative and open art. It is the discovery of new perspectives and the training of creative skills. All materials that can be used around people can be called materials. Materials exist in people's lives, but also in the evolution of human history and social progress. The form in memory is a part of modeling design reference. Through our logical thinking and image thinking, we can find and develop more new models. These two kinds of thinking are intertwined with each other. We should not only find the form according to logical thinking, but also develop the form according to image thinking on the basis of a certain table body [11]. Here, logical thinking is the basis of image thinking, some shapes can be obtained by one method alone, and some shape design can be obtained by more than two methods. Through this way of thinking, we can create more rudiments of furniture modeling design, which becomes the selection basis for balancing the purpose of modeling design.

The organic form of nature is formed after a long period of natural evolution. In order to survive and develop, these organisms exist in the most suitable way and form of natural law. People draw inspiration and modeling inspiration from nature through modeling and creation of nature, and apply the organic form of nature to all aspects of life. In the furniture design reflects the cultural connotation, not a single thing or a kind of material use, but from multiple angles, it has diversity and complexity. Furniture design is mainly in accordance with the use of building projects and environmental standards, through modern architectural design concepts and means to enhance the beauty and comfort of the indoor environment, to ensure the rationality of various functions, so as to meet the spiritual and material needs. After getting all kinds of basic forms, no matter the size of the form, simple or complex, regular or irregular, we can't use aesthetic vision to decide whether to choose or not in isolation. Once some forms are combined with other forms, they are adjusted in size or structure, and the relationship between them is well dealt with, which is immediately quite new. In the design of furniture modeling, the elements with great difference in the ratio of length to width are called line elements. Line element has the function of decorating and dividing panel in furniture. Line elements can also be used as the main elements of furniture, through the different arrangement of line elements to shape the main shape of furniture. In the early stage of design creation, we need to analyze the surrounding environment, regional cultural characteristics and the characteristics of users to carry out furniture design creation according to local conditions, and strive to achieve the organic unity of "human furniture architecture nature". The operation process of furniture modeling cooperative design is shown in Figure 1.

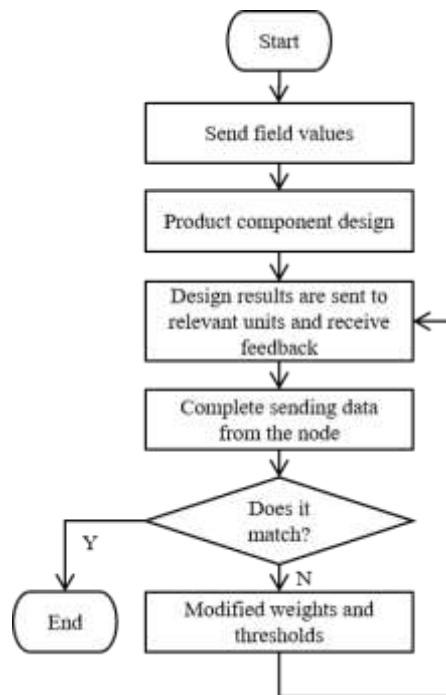


Fig.1 Cooperative Design Operation Process

In the process of furniture design, how to make scientific layout and give people a comfortable feeling is an important problem faced by furniture design, and it is also an important content that should be paid attention to in the process of furniture design. At present, the trend of economic globalization is becoming more and more frequent, and China's development is also diversified. For design, because of the influence of globalization and various styles, the indoor environment with Chinese characteristics is facing a crisis. Therefore, creating an indoor environment with Chinese characteristics is not only the requirement of current development, but also the demand of people for the indoor environment. In the process of modern furniture design, it is important to be brave in design innovation and boldly break the traditional aesthetic concept. In terms of spatial elements, we must pay attention to innovation and exploration, and enhance the spatial image through technical means, not limited to the traditional spatial design image. Some designers didn't deeply analyze the geographical environment characteristics of their region in furniture design, so they didn't combine national culture with landscape well in furniture design. Furniture design should not only meet the functional needs of buildings, but also study people's psychological needs and further improve the psychological feeling value of indoor environment [12]. For designers, they need to be able to integrate cultural elements into the design from multiple angles to reflect the cultural charm, and at the same time, they need to combine modern people's concepts and requirements for furniture design to reflect the cultural connotation. Furniture design is related to contemporary technological progress in creating people's living and working conditions. New structures, new materials and new household equipment can push the elements of furniture design into new fields. In the process of material selection, we should pay attention to mutual coordination, dare to break the routine and use more new decorative materials.

III. Innovative Design of Furniture Modeling

Design is a creative activity in which people conceive or plan an action or thing before actually taking action or making something to meet a certain need, and realize this conception or plan by certain means. The beauty and ugliness of modeling design lies not only in its own shape, but also in people's emotional will. The furniture of Ming Dynasty is concise and simple, with well-proportioned and strong lines. To convey the cultural connotation in furniture design, designers need to integrate cultural elements into the design, not at a certain point, but from the overall indoor space. When having the same objective conditions, due to the different ideas of designers, the behaviors and results produced are also different [13]. In the process of furniture design, rational use of interior space is an important content in interior innovative design. Reasonable use of space can not only make people feel

comfortable, but also provide people with a good living environment, in which people are in a state of physical and mental pleasure. In the process of modeling design, we should fully consider the viewer's emotional will. Today's aesthetic fashion, people's requirements for furniture modeling tend to be more diversified and personalized, especially the yearning for nature, and people seek to return to nature and discover themselves in aesthetics. The overall structure of the innovative design system is shown in Figure 2.

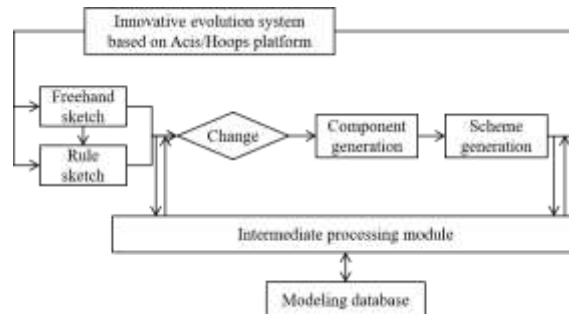


Fig.2 The Overall Structure of the Innovative Design System

Furniture is an industrial product with both material and spiritual functions, which not only needs to meet the functional needs of daily life, but also meets people's rational needs and creates an environmental atmosphere. For the whole modeling itself is a kind of decoration and division, only when the modeling design is not too cumbersome and messy, the materials and modeling after production can complement each other. Only by getting familiar with the characteristics of the craft materials and determining the shapes suitable for the materials can we obtain a complete and unified effect. Therefore, the understanding, selection and application of the craft materials are all important links in furniture modeling design. In the process of interior color design, it is necessary to combine the exterior style of the building, the actual use of the interior, and the length of stay of the user indoors, and combine the designer's actual design concept to make reasonable color contrast and collocation. In the process of furniture design innovation, the key work that designers should do is how to make reasonable collocation after reasonable material selection, and get the ideal design effect through collocation. make

Type is the most intuitive visual information, which conveys beauty and feelings. The beauty of modeling can stimulate people's pleasant feeling, and make people enjoy beauty, resulting in the desire to buy. Therefore, furniture modeling design is a very important factor in the commercial field. A good piece of furniture should combine materials and functions perfectly under the guidance of modeling design. The temporal relationship among the different stages of computer-aided furniture modeling design technology is shown in Figure 3.

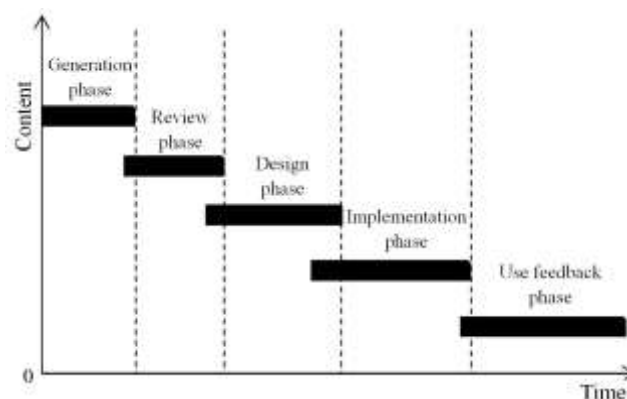


Fig.3 The Relationship in Time between the Various Stages of Furniture Modeling Design Technology

For furniture designers, facing the update and upgrade of modern household goods, they must optimize and innovate the existing design ideas and find out more design innovations. The furniture design system uses various virtual reality technologies to create a virtual indoor environment based on digital models, through which users can experience furniture design effects. Figure 4 is a viewing scene under 3D virtual reality technology.



Fig.4 Vr Viewing

Furniture modeling design is based on the specific use requirements and people's normal requirements, so that the form and function of modeling can be perfectly unified. In modeling design, we should base ourselves on modern people's living habits, study and solve problems with scientific methods, guide life with artistic design, observe people's lives keenly, and observe the functional utility of furniture design in our lives. Functional utility does not absolutely constrain the creation of modeling design, it is the expression of logic and scientific truth in life in modeling. The integration of formal aesthetic feeling, functional utility and material technology should run through the whole process of design thinking [14]. Home design does not depend on high-grade materials, but needs to improve the environmental quality through furniture design. Elegant furniture modeling plays a very important role in improving the taste of the whole home environment. Modern furniture design has been difficult to make a breakthrough in furniture materials. Only by grasping the aesthetic requirements of modern people for furniture, combining the technical techniques of modern machine vision, carrying out innovative design of furniture modeling, and selecting appropriate materials to express, can it stand out in the stimulated market competition.

IV. Conclusions

With the change of people's lifestyle, the demand for furniture is constantly changing, and at the same time, it puts forward higher requirements for furniture modeling. Therefore, furniture modeling design must take humanized design as the premise, pay attention to the psychological needs of users, and design furniture modeling with practicality and artistic sense. Furniture modeling design has always been the key point and key point of innovative furniture design, and the application of organic form in furniture modeling design is inseparable from factors such as material, form, structure and function. They are an indispensable part of the whole furniture, and each part brings new inspiration and enlightenment to the innovative design of furniture design. With the improvement of automation and informationization of domestic furniture manufacturing industry and the continuous improvement of product quality requirements of the whole society, the new technology and new concept of machine vision will be deeply rooted in people's hearts. Home design does not depend on high-grade materials, but needs to improve the environmental quality through furniture design. When choosing and matching decorative materials, it can fully reflect the creativity of designers. In modeling design, we should base ourselves on modern people's living habits, study and solve problems with scientific methods, guide life with artistic design, observe people's lives keenly, and observe the functional utility of furniture design in our lives.

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