

Analysis of Industrial Product Modeling Design under Virtual Reality Technology

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Abstract: The application of virtual reality technology in the design of industrial products can obviously change the way of traditional industrial design in the past, and it can also bring a very key promotion effect to the development of modern industrial industries. This article first analyzes the principles and foundations of industrial product modeling design, and then analyzes design cases, and finally puts forward the implementation strategy of industrial product modeling design work after virtual reality technology is put into use, hoping to provide a reasonable reference for the implementation of related work.

1. Introduction

Industrial product modeling design under virtual reality technology is usually called virtual design and manufacturing, which refers to the comprehensive application of simulation, modeling, analysis technology and related tools, and its role is to enhance the rationality and innovation of industrial product modeling design degree. After using this technology at the same time, the entire process of product design can be mapped out in the virtual environment, generally starting from the concept and fully displaying the product life cycle.

2. The Principles and Foundation of Industrial Product Design

The current virtual product development research related work mainly focuses on visualization, environmental structure, information expression and other aspects. Obviously, mature industrial product modeling needs to have both practical functions and technical design, and the two should be organically combined as much as possible. It belongs to a relatively rigorous community of engineering sciences and creative disciplines, and multiple processes and types of work are involved in the process of use. The main factors that can affect the modeling of industrial products are shown in Figure 1.

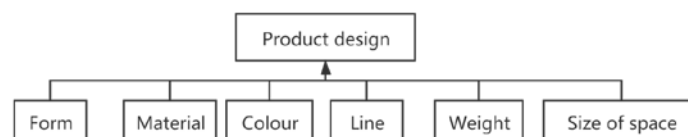


Fig.1 Influencing Factors of Product Styling

Industrial product designers need to use different methods and thinking in their work as much as possible to convert abstract art into real shapes, and it involves many directions. Under normal circumstances, designers will choose products that are more in line with the public's aesthetic and actual needs. Carry out styling design. The specific aesthetic standards are shown in Figure 2^[1].

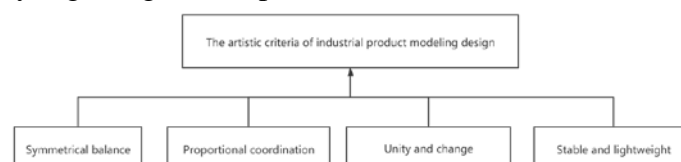


Fig.2 Aesthetic Criteria for Industrial Product Modeling

3. Industrial Product Modeling Design Case under Virtual Reality Technology

3.1 Hardware Configuration

A designer uses virtual reality technology to design industrial product models. The system hardware used is 3.6GHz AMD Ryzne 5. The system has 8GB of memory, 500GB of hard disk, and the graphics accelerator card is Ge Force CTX1050TI, DRAM4GB. The overall virtual reality environment hierarchy is as follows Shown in Figure 3.

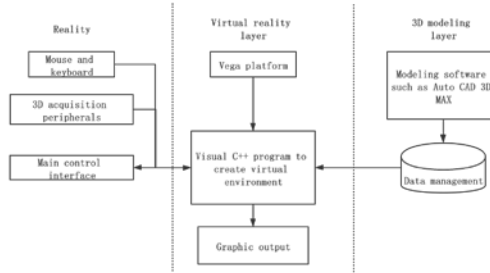


Fig.3 .Hierarchical Structure of Virtual Reality Environment

3.2 Modeling Analysis

In the virtual reality environment designed with the above hardware, the designer combined the influencing factors and aesthetic rules of industrial product design to design the shape of a civilian telescope, as shown in Figure 4.

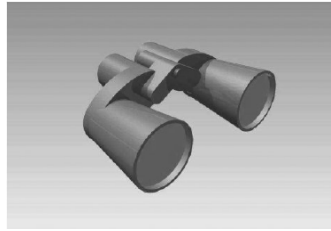


Fig.4 Civil Telescope Products Designed by an Industrial Product Designer

It can be analyzed from Figure 4 that the high-quality product design can meet the most basic artistic needs.

4. Industrial Product Modeling Design Strategy under Virtual Reality Technology

Using virtual reality technology to implement product modeling design, staff need to go through multiple processes such as sketch design and model construction. Taking the design of a car model as an example, the designer has mainly gone through the following several links.

4.1 Construction Sketch

The sketch was obtained by the designer on the basis of the original idea. In the end, the sketch that fits more closely with the theme was selected among the two schemes. The central idea of the design is to reduce the resistance of the car model during driving, and the final shape is positioned as a streamlined shape. After the basic shape is determined, the designer completes the design according to the car's performance and starts the drawing of the two-dimensional plan.

4.2 Assembly Modeling

After the construction of the sketch is completed, the designer combines the various parts of the car model to create a three-dimensional virtual model. The designer uses the 3DMZX software system to complete the modeling on the computer, and pay attention to the error of the parts Control within 1%. After the production of the part model was completed, the staff integrated the parts at

the first time, revised the unreasonable positions in time, and completed the assembly of the entire car model according to the steps. Regarding the matching problems of the parts during the assembly process, the designer also adjusted the accuracy within a reasonable range. Virtual reality technology breaks through the shackles of two-dimensional planes on the basis of traditional design methods. When designing, staff can choose to use computer policies and artificial intelligence and other technologies to cooperate with each other, and finally combine the functions, performance and performance of the product itself in the three-dimensional space. The quality is displayed, and it is easier to bring freshness to consumers when it is finally put on the market.

4.3 Dynamic Demonstration

The dynamic demonstration of the car model needs to be assisted by the Clut plug-in^[2]. When the designer saved the model file, he uniformly modified the format into a format that can be opened by the plug-in. The method is to use the software to open the file after the plug-in installation is over, and then dynamically build the car model. Taking the production of a car door as an example, the designer designed a separate opening animation for the car door. You only need to use the mouse to select the car door, and set the door to rotate on the Z axis at a positive and negative angle of 60°, and then change the steps in the above process. The connection completes the setting of a Donghua route. After that, the designer only needs to press the play button during the presentation, and the model can complete the demonstration of the door switch by itself. In order to improve the reality of the animation effect, the designer also set the starting animation path of the steering wheel and the engine synchronously according to the above steps. When displaying several parts of the animation, the authenticity of the model has also been improved.

4.4 Adjust the Color

In the process of industrial product modeling design, the choice of color is also one of the important steps of the design. Designers are required to make a more reasonable design of the color matching of the car model on the basis of ensuring the shape design and optimization of the car model. In this process, the designer takes into account the needs of users, and on the basis of meeting their requirements, as much as possible to enhance the impact of the car model in terms of visual effects. At present, the colors of cars in our country are mainly calm and cool. In addition to being beautiful, this color can also make pedestrians and drivers feel safe. It also has a relatively obvious effect on smooth driving and can reduce the occurrence of safety accidents^[3]. Possibility function. Therefore, the designer also chose black on a large area, and used metallic colors as embellishments on the frame on the basis of pure colors, so that the color matching of the car model is calm and lively, and it can also be loved by young consumers.

5. Conclusion

In summary, virtual reality is a three-dimensional environment based on computer technology, in which people can directly manipulate virtual objects and interact with them through human expressions. All in all, the application of virtual reality technology in the process of industrial product design is of great significance, and it is in the process of continuous improvement, and the future application prospects are good.

References

- [1] Hu Xingye. Research on the characteristics of industrial product modeling design courses based on 3D printing technology[J]. Modern Manufacturing Technology and Equipment, no.04, pp.210-212, 2020.
- [2] Li Yin. Genetic algorithm in the virtual reality environment in the design of industrial products [J]. Modern Electronic Technology, vol.43, no.05, pp.129-132, 2020.
- [3] Jiang Xiaobo, Tu Kangwei. Optimization of solving complex problems in industrial modeling

design under virtual reality environment[J]. Modern Electronic Technology, vol.42, no.09, pp.155-162, 2019.