The Application of Virtual Reality Technology in Industrial Design

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Keywords: Industrial Design; Virtual Reality Technology; Application

Abstract. With the continuous development of the society, the advancement of science and technology is advancing with each passing day. Different technologies have been merged to create new technologies. In particular, the continuous advancement of network technologies has made the use of virtual reality technologies be more and more common in social life. This has made industrial design activities integrate with modern manufacturing technologies, which is an innovation of industrial theories and methods to some extent. This paper will elaborate on the necessity of the application of virtual reality technology in industrial design, and focus on the specific application of virtual reality technology in industrial design to promote the improvement of industrial design.

The application of virtual reality technology in industrial design is basically based on modern information technology, combined with advanced manufacturing technology and product theory with the purpose of presenting better industrial design activities. Virtual reality technology is a relatively perfect computer system, and it is an extremely realistic technology and method, which plays a good role in promoting industrial design activities. This paper focuses on this to carry out a more comprehensive analysis and exploration, focusing on the analysis of the advantages and practicability of the application of virtual reality technology in industrial design, which will be used to lay a good foundation for the subsequent research.

The Characteristics of the Industrial Design Based on Virtual Reality Technology

Virtual reality technology has achieved relatively remarkable results in the application of modern industrial design. Virtual reality technology is a technology based on modern information technology and computer technology to receive and store, transfer and process various media information. Virtual reality technology is a highly realistic simulation technology to a certain extent. It can fully simulate the behaviors of humans in the natural world such as audiovisual and action. It is a technology that optimizes the human-machine interface. This relatively valuable virtual reality technology plays its own advantages and characteristics in industrial design activities. The characteristics of industrial design based on virtual reality technology are as follows: network, interaction and high efficiency. This type of industrial design usually constructs a parallel structural design system based on network technology, which can integrate design, engineering analysis and manufacturing into one system. On the one hand, before the actual production, the product can first form a digital prototype in the virtual manufacturing environment, and then the related personnel can remanufacture to meet the needs of the market by predicting and evaluating the appearance and performance. In carrying out the above work, the Internet plays its own key role, and it can provide feedback to each other in different places; on the other hand, in order to better respond to market demands, we can use the Internet to temporarily build corresponding cooperative economic entities for the different companies involved in the product without space constraint, which only relies on computer networks to make unified command. This reduces the product design cycle to a certain extent, reduces development costs and prompts the system to quickly respond to market changes. We can also use the Internet to build multi-user shared information resource bases, and then apply virtual models according to their own needs. Networking in virtual reality industrial design is a very important symbol. The industrial design based on virtual reality technology is mainly based on three-dimensional digital model. This virtual world is basically the entire virtual environment. There is also a combination of given simulation objects, which acts on people through visual and auditory forms. The perception of the environment, all the operations or modifications are reflected

in the digital model, which can maximize the realization of good information interaction between people, people and machines, so the interaction is virtual reality technology, which is a very important feature in industrial design.

The Impact of Virtual Reality Technology on Industrial Design

Design concept impact

The industrial design of virtual reality is promoted in most areas. Industrial designers participate in the whole process, especially production and sales, and are responsible for their own design. Industrial design mainly includes the following two parts, namely the exterior design and the engineering design of industrial products, and other aspects: market research, consumer survey and public relations planning. This requires designers to have a very strong overall consciousness, play an appropriate role in different stages, and also need to maintain close communication with experts in different fields and work together in order to transform good design concepts into new products; in addition, it is also necessary to gain expertise in other fields, such as engineering technology, manufacturing technology, material development, etc., to involve new knowledge in different areas, to grasp the social pulsation, and to appropriately give resonance to the concept of innovation. To make virtual technology be universally adopted in actual industrial design, the evaluation standards should be improved, and more emphasis should be placed on design quality issues to reflect product innovation and science.

Industrial Design Method Impact

In the past, industrial design basically used two-dimension plans to express designers' ideas. Although computer-based three-dimensional software is involved, the resulting renderings are mainly based on three-dimensional renderings, which does not accurately convey the designers' intentions. The use of virtual reality technology in industrial design largely solves the above problems. It can change the design method to a certain extent. Usually, the three-dimensional model is used as the carrier, so as to better highlight designers' intentions. In the design process, others can arbitrarily enlarge the model or rotate the model according to their own needs and actively request information, so as to truly highlight the connotation of industrial design. Industrial design is basically built on the basis of science with the ultimate goal of giving art to industrial products, which is a fusion of perceptual and rational thinking. Virtual reality technology is applied to industrial design. At different stages of design, relevant personnel can use virtual digital models to quickly start different investigations and experiments and obtain more comprehensive applications, which makes models be more closer to real experimental data and product design be more scientific and objective based on practice.

Application of Virtual Reality Technology in Industrial Design

Demand analysis phase

The application of virtual reality technology in industrial design is the innovative application of technology. First of all, the application of industrial design needs stage generally requires a large number of market surveys. Currently, there are basically two methods for screening market surveys, which are telephone and direct survey, which is less targeted and the source of information is not perfect. It is assumed that   virtual reality technology is used in market survey through Web pages, the interests of interviewees can be stimulated. The information obtained will be much richer, more accurate and more targeted. Before the product design, the market demands can be fully understood. The web-based virtual design environment can highlight product features and functions and present to users to the utmost extent. Users' feedback information can be used to obtain personalized demand information. The designed industrial products can conform to the structure of custom principles. In addition, the corresponding functions of virtual design, such as communication functions, can realize real-time communication, by which customers and designers can communicate better and then put forward their own suggestions and opinions.

Concept design application

Concept design is a manifestation of creative thinking, and concept products are idealized material forms. Concept design is a conception of the initial stage of products to some extent with the clear purpose of capturing the shape of products. From an overall perspective, this is an important part of product design, because 60%-70% of the product cost is usually determined by conceptual design. In concept design, with virtual reality technology, designers can provide more input methods, such as language recognition and gesture tracking, so that designers can perform product manipulation or component manipulation anywhere in 3D virtual environment, then change product shape modeling, and develop the object of the observation in 3D space, at the same time, conduct appropriate operation, so as to obtain a relatively large number of product styles, as well as the shape of the relevant information, so as to achieve relatively satisfied results. For example, brainstorm can be used to give products more creative ideas and virtual reality technology can be used to incorporate more experiences into design ideas, in other words, uses' feelings are not products themselves. At the time of design, in different virtual environments, make different users and enthusiasts personally experience and modify product models. Touch screen is used to screen products' modeling, color and decorative styles to build a relatively realistic 3D model in a virtual environment, making more customers see the effect of products until they achieve the most satisfied results.

Detailed design application

After the conceptual design is completed, the detailed design phase is crucial and includes the following: detailed part design, detailed process design, etc. It is critical to be able to make detailed analysis of the assembly. In the implementation of complex product structure design process, virtual reality technology can visually reproduce assembly analysis and avoid irrational places. Virtual equipment uses computer equipment to analyze and simulate the product assembly process and assembly results, and evaluate and forecast the product testing model. The engineering decision-making is more scientific and cannot support the actual product. With the development of science and technology, virtual manufacturing is the main mode of development of the industry in the future. It solves all problems from the design of parts and components, which makes it possible to shorten the product development cycle, reduce production costs and optimize product performance.

Virtual Manufacturing

All products must go through the trial production stage before they are put into production, which includes the trial production of tooling and of products. The whole process is complicated, which does not only cost money, but also takes time. This has a serious impact on the product development progress to a certain degree. Virtual reality technology can maximize this process when being applied. Virtual reality technology plays a very key role in the virtual manufacturing process, which can identify potential problems, take appropriate preventive measures to achieve one-off product success and reduce costs in actual design stage, reduce product development cycle and strengthen product competitiveness.

Conclusion

The application of virtual technology in industrial design is the technological innovation and progress of industrial design, and has achieved good practical results. The rapid development of virtual reality technology at this stage has a profound effect on different stages of industrial design. All processes of industrial design have formed complete new changes. With the continuous deepening of virtual reality technology, they can meet the needs of current industrial design. This paper briefly describes the characteristics of virtual reality technology and the value of the application in industrial design in order to promote industrial design to achieve more satisfactory results.

References

[1] Fang Pinglong. Application of Virtual Reality Technology in Industrial Design[J]. China New Technology and New Products, 2018(04): 69-70.

[2] Ran Yang, Zhu Fei, Chen Kang. Application of Virtual Reality and Augmented Reality Technology in Industrial Design [J]. Laser Journal, 2010, 31(01): 4-6.

[3] Lv Qin. Application of Virtual Reality Technology in Industrial Design[J]. Science and Technology Innovation Herald, 2017, 14(25):115-116.

[4] Huang Kun. Application of Virtual Reality Technology in Industrial Design[J]. Journal of Chifeng College(Natural Science Edition), 2017, 33(11):38-39.

[5] Gao Yuanhua. Application of Virtual Reality Technology in Industrial Design [J]. Modern Decoration (Theory), 2016(02): 119.