Exploration on the Application Path of VR Technology in Modern Ceramic Product Design

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Abstract. Firstly, this paper analyzes the concept of VR technology and its application status in ceramic products, and then deeply analyzes the application advantages of VR technology in ceramic product design, including detailed discussion and planning on the repeatability of ceramic product design, breaking the space and time constraints of traditional ceramic product design, and the ability of VR technology to meet the requirements of the times. Finally, it expounds the application path of VR technology in ceramic product design. Through the exploration and analysis of VR technology, we can understand the characteristics of VR technology and fully apply it to the design of modern ceramic products, making the design of ceramic products more modern.

Keywords: Ceramic products · Design · VR technology · Application path · Research and analysis

1 Introduction

In recent years, with the rapid development of Internet of Things, big data and other network information technologies, people's lifestyles and working methods have changed. In particular, the application of VR technology in life has changed the methods of production design of many products. For example, the application of VR technology in modern ceramic product design can not only change the traditional ceramic production mode, but also provide a platform and modern inspiration for ceramic product design, making the designed ceramic products more modern and more in line with the development needs of modern environment. Immersion, interaction and imagination are the three characteristics of VR technology, which can provide convenience for modern ceramic design. In the future, the design of ceramic products based on VR technology is bound to become the development trend in the field of ceramics.

2 The Concept of VR Technology and Its Application Status in Ceramic Product Design

2.1 The Concept of VR Technology

VR technology is also called virtual reality technology. VR technology is a brand-new practical technology developed in the twentieth century. Its basic realization method is based on computer technology, using the latest development achievements of 3D

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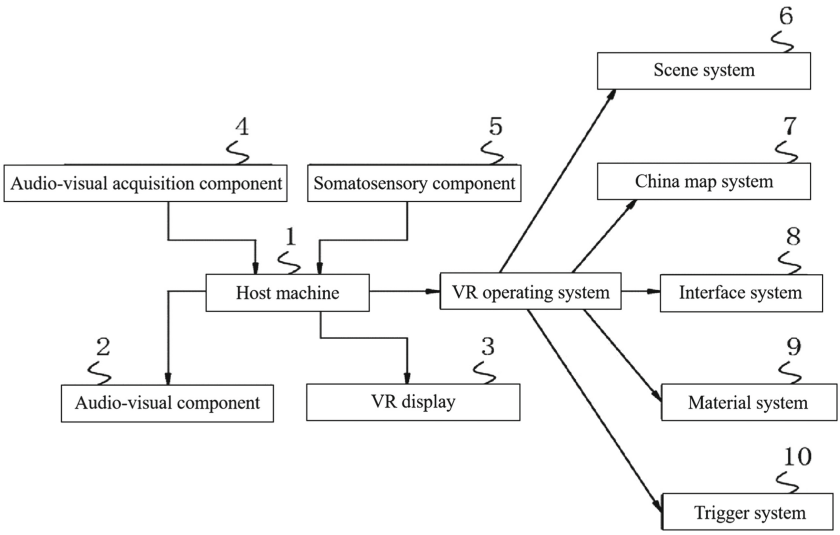

Fig. 1. Schematic diagram of VR system

graphics technology, multimedia technology, simulation technology, reality technology and other high-tech, and producing a realistic 3D space with the help of computers and other equipment, which can make people feel immersive in the virtual space. A complete VR system generally includes scene system, interface system, trigger system and somatosensory components, etc. Figure 1 is the schematic diagram of a complete VR system. In recent years, with the continuous development and progress of social science and technology and productivity, the demand for VR technology in all walks of life is growing, and VR technology has also made great progress in today's society, and has gradually become a new scientific and technological field. VR technology can build virtual scenes, and combining virtual scenes with innovative things can make users feel the visual impact. At present, VR technology has been widely used in the fields of games, home and product design, especially in the design of ceramic products. By using VR technology, the traditional design mode of ceramic products can be broken, and the design of ceramics can be more modern and innovative [1]. By using VR technology, the display of products can break through the limitations of time, space and region, and the products can be spread and shared by using network technology and visualized by using VR technology. The emergence and application of VR technology has greatly changed people's way of life and work, and brought innovation and breakthrough to product design.

2.2 Application Status of VR Technology in Ceramic Product Design

VR technology enables users to build a virtual three-dimensional space through hearing, vision and hearing. Users can control in the virtual space by using VR devices such as intelligent remote sensing handles and virtual simulation glasses (Fig. 2 shows VR glasses). Through VR technology, users can actually experience the immersive feeling,

and the built virtual environment can give users a visual impact. So far, VR technology has been applied in many fields in China, and the development of VR technology is becoming more and more perfect. At present, it has three technologies: hearing, vision and touch, among which there is no way to simulate the smell completely. With the improvement of users' demand and the rapid development of related software and hardware, VR technology has been applied to the field of ceramic product design. The virtual simulation function of VR technology is used to simulate the real ceramic shape and real environment, and it is transmitted in the network through the Internet. In this way, whether users visit the ceramic museum or not, they can feel the immersive feeling and the charm of ceramics. At the same time, the operability of VR technology can be developed and applied, and the efficiency of ceramic product delivery can be improved through some recreational activities. VR technology can break through the limitation of time and space, and has the characteristics of time–space interaction. Through computer-aided equipment, 3D environment can be transformed into 4D environment, providing people with a real virtual environment to the greatest extent. When using VR technology to transmit information, making full use of visual guidance in scene construction can restore the real environment, process all kinds of information, strengthen the visual experience of users and make the virtual reality effect reach the best. The production, design and production process of ceramics is complicated, so it is inevitable to encounter some problems in the production process, such as the inability to observe the internal phenomena of ceramics in time and the inability to know the internal molding situation of ceramics in time. VR technology uses computer simulation to create a virtual world of three-dimensional space, which can provide users with sensory simulation such as vision, and can observe things in three-dimensional space in time and without restrictions. At present, VR technology has been widely used in the design and production of ceramic products, which brings convenience to the design of ceramic products and improves the user's experience [2].

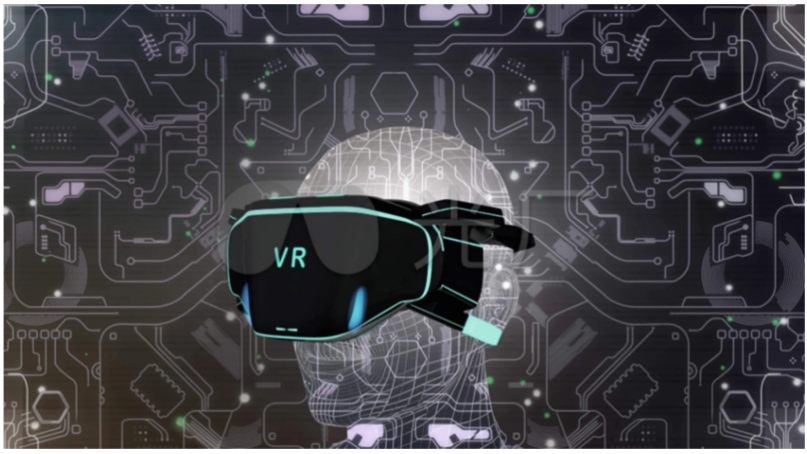

Fig. 2. VR glasses

3 Advantages of Applying VR Technology in Ceramic Product Design

3.1 In Line with the Development Trend in the New Era and Environment

With the popularization and wide application of network technology, it indicates that China has entered the information age, and some softwares have emerged. Online shopping softwares such as JD.COM, Vipshop and Pinduoduo are the earliest shopping softwares. These platforms are presented to users in a two-dimensional way, and the design of pages is mainly based on words and pictures. Later, a batch of video-brushing software appeared, such as Aauto Quicker, Tik Tok and other software, which mainly focused on video in page design, but people were not satisfied with this two-dimensional mode, hoping to experience things personally through a virtual environment. Ceramic products are one of the important ways for people to understand ceramic culture, so the design of ceramic products should keep up with the development trend of the times. VR technology should be applied to ceramic design, and the immersive interaction of products can be realized by VR technology, and the ceramic products can be presented to users in three dimensions. At the same time, the front-end interaction technology can be used to publish ceramic products on the Internet, so that users can visit ceramic products anytime and anywhere, and users can also interact with ceramic products in an immersive way across time and space, which brings great convenience to the design of ceramic products [3].

3.2 Realize the Timely Development of Ceramic Product Design

There are many production processes of ceramic products. First, we should carry out the conceptual design of ceramics, then carry out the structural design, and finally carry out the product production. Conceptual design and structural design need to meet the needs of customers and ceramic enterprises. If customers are not satisfied with the structural design or conceptual design, they need to constantly modify the design drawings until the customers are satisfied. However, because each customer has certain differences in the definition of ceramic beauty, it is inevitable that ceramic products will be exchanged and modified repeatedly in the design process. This will not only slow down the production speed of ceramic products, but also make ceramic products lose their essential beauty, lengthen the design cycle of the whole ceramic products, and eventually increase the production cost of ceramics [4]. With the continuous development of information technology, people's living standards are improving day by day, and people's demand for ceramic products is diversified. The traditional design mode of ceramic products can no longer meet the needs of users, so we must pay attention to the communication and interaction with customers in the design of modern ceramic products, and control the production cycle not to be too long. The application of VR technology can effectively solve the above problems. Firstly, it can communicate with customers in time by using interactive technology and Web technology. Secondly, three-dimensional technology can be used to observe the internal structure of ceramics in real time, and if customers propose modifications, they can meet the needs of customers in time. At present, the three-dimensional imaging technology of VR technology has been widely used in the

design of ceramic products, achieving timely communication with customers, effectively shortening the ceramic design cycle and improving product production efficiency [5].

3.3 Realize the Design of Ceramic Products Across Time and Space

The design and production process of traditional ceramic products is complicated, and it takes a long period from conceptual design to demand design to production completion, and the requirements for the environment are also strict. When producing and designing ceramics, the firing environment and time should be strictly controlled, which will limit the production design of ceramics by time and space. With the continuous development and progress of science and technology, the production mode and working mode of various industries should also be dealt with in a brand-new mode, especially the design of modern ceramic products should keep pace with the times. Ceramic design and virtual reality development are perfectly combined, so that customers can visit ceramic products remotely, and customers can interact and understand ceramic products at close range through virtual environment. If customers have different opinions on the designed ceramic products, they can express them in time, thus realizing the design of ceramic products across time and space [6].

4 Analysis of the Application Strategy of VR Technology in Ceramic Product Design

4.1 Make Full Use of the Interactive Function of VR Technology in Ceramic Design

It is an interactive function in VR technology to enable users to control products in virtual space. Users can actually observe products and have a detailed understanding of products through interactive functions, and can also investigate and analyze users' preferences, so as to make the design of ceramic products more modern and meet users' needs. There are four kinds of interactive design based on ceramic products, namely, virtual switching design, material modeling interactive design, product detail display interactive design and viewing mode interactive design [7]. First of all, the virtual switching design can connect text parameters and attributes, and users can conveniently switch virtual content when visiting ceramic products in virtual space, thus realizing the conversion of ceramic products. Secondly, the interactive design of ceramic modeling and materials is mainly reflected in the repeated modification of ceramic design (Fig. 3 shows the application of VR interactive technology in ceramic modeling design). Ceramic products have many characteristics and semantics. Interactive design can provide users with independent design according to the characteristics and semantics of ceramics. Users can choose their own ceramic shapes and colors, and can repair and change the ceramic design in time through interaction. The traditional product display is generally based on picture display, which can not meet the viewing needs of users. The interactive design of product details display can realize the user's 360-degree view of the product. The virtual ceramic product can be scaled down or enlarged through the joystick operation device, and the product can be turned over to realize the view of product details. In addition, the

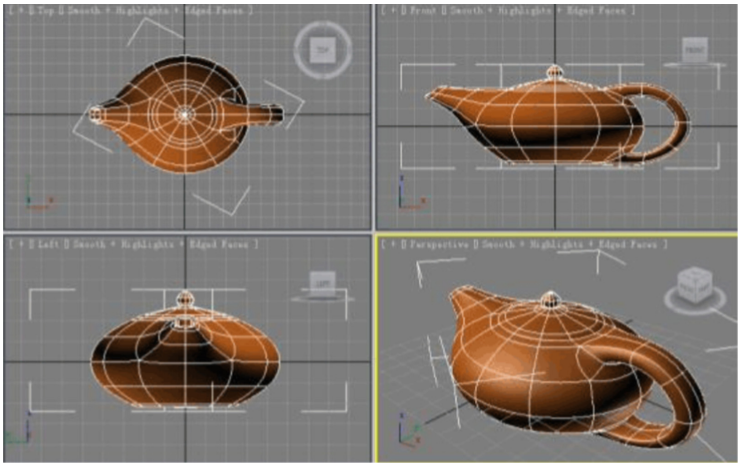

Fig. 3. Application of VR interactive technology in ceramic modeling design

interactive design of ceramic products can be further realized through a series of sensory devices such as voice control operation and touch. The interactive design of viewing mode can set different playing scenes and visiting ways according to the characteristics of different ceramic products. For example, some products need to be experienced by touch, while others need to be experienced by hearing. In a word, giving full play to the interactive function of VR technology in the design of ceramic products can not only shorten the product design cycle, but also improve the product design effect and promote the development of modern ceramic products [8].

4.2 Choosing the Appropriate Ceramic Design Technology

When designing ceramic products with VR technology, we should first consider the needs of customers and the characteristics of ceramic products, and choose different VR technologies according to the different characteristics of ceramic products, so as to highlight the characteristics of ceramic products. The first step of ceramic product design is to get the customer's demand, and then choose the appropriate VR technology according to the characteristics of ceramics. Then the traditional ceramic manufacturing method is used to make the product model first, then the 3D scanning technology is used to scan the product model machine and obtain the environmental parameters and text parameters of the product, and finally the virtual simulation ceramic product consistent with the product model is made [9]. After the virtual product is designed, it is necessary to complete the construction of the virtual environment. In the process of environment construction, it is necessary to ensure that the parameters of the virtual environment are consistent with those of the real environment, and then lighting treatment and some software equipment should be used in the scene layout, so as to ensure that the built virtual environment conforms to the real environment and restore the authenticity of the product. Attention should be paid to the following points when lighting ceramic products. There are some differences in the treatment methods used for ceramic products with different

materials and shapes. When importing the built 3D model into Unit3D, it is necessary to ensure that the materials are completely attached to the model, and when rendering ceramic products, it is necessary to ensure that the parameters taken by the camera in every corner and detail of the product are consistent, so as to make the rendered virtual products more authentic. The application of lighting plays an important role in the design and exhibition of ceramic products [10]. Taking the "half-knife mud cup" in Jingdezhen ceramic exhibition in 2022 as an example, lighting should be injected into the cup during the exhibition, so as to show the lines on the cup and the details of carving process. To sum up, if you want to design and display ceramic products with VR technology, you must choose the appropriate technology and handle the lighting effect according to the characteristics of ceramic products, so as to fully display the beauty of ceramics and make virtual ceramic products more in line with the real ceramic model.

5 Conclusions

The application of VR technology in ceramic product design can break the time limit and space limit of traditional ceramic product production. A virtual ceramic scene is built by using virtual simulation technology, and users can visit ceramic products at close range through the interactive function of VR in the virtual simulation space, so that users can experience the immersive feeling, and merchants and customers can communicate better to facilitate the design of ceramic products. With the continuous development and progress of computer technology, the application of VR technology in ceramic product design is bound to become a mainstream mode in the future.

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