Analysis on the Application of Virtual Reality Technology in Automobile Model Design

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Abstract: With the development of China's economy and the continuous advancement of science and technology, the market competition faced by the automobile manufacturing industry is gradually intensifying. In order to maintain its own market competitiveness, relevant enterprises need to continuously develop and produce high-performance and high-quality cars, traditional designs. The manufacturing method can no longer meet the basic needs of the current market development, and actively carrying out technological innovation is the only way for enterprises to continue to develop in the new era. Virtual reality technology is a simulation technology that is gradually developed by integrated sensing technology, human-machine interface technology, display technology, analog technology, multimedia technology, artificial intelligence technology, and three-dimensional graphics technology. The application of simulation technology in automotive design can significantly shorten the development cycle, reduce R&D costs, improve the competitiveness of the enterprise market, and have broad development prospects, which deserves in-depth study.

1. Introduction

With the advancement of technology, VR virtual reality technology has been widely used. Through this technology, people's understanding of automobile related knowledge has gradually deepened. Many auto companies have increased their emphasis on VR virtual reality technology under the new situation. In the design, sales and promotion of automobiles, this technology has been widely used to achieve its own comprehensive development. The application of VR virtual reality technology in the process of automobile R&D is currently in its infancy. Through the rational use of this technology, the R&D cycle can be shortened, and the post-propagation work can also be promoted. Therefore, auto companies need to pay more attention to technology. To improve the competitiveness of the market.

2. Overview of VR virtual reality technology

VR virtual reality technology is referred to as VR technology, also known as artificial environment or spiritual technology. This technology mainly uses computer simulation to generate a virtual world with three dimensions, providing users with realistic senses such as touch, hearing and vision. Simulation, the user can use this technology to observe various things inside the three-dimensional space anytime and anywhere without any restrictions. There are many contents in automobile R&D and design, and the overall cycle is relatively long. In order to improve the market competitiveness of enterprises, enterprises need to adopt scientific technology to achieve a comprehensive shortening of the modeling cycle [1]. Under normal circumstances, the design of the car mainly includes verification model making, A-side production, sludge model making, rendering drawing, and sludge model making. Among them, CAS data production and sludge model production need to be continuously adjusted, and the difficulty of making and modifying the physical model is compared. Large and time-consuming, the automobile design stage often consumes a relatively long time. In order to solve the actual demand and improve the design efficiency, many automobile companies actively use VR virtual reality technology to shorten the design cycle and reduce the model cost.

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3. The components of VR virtual reality technology

Virtual reality system is a new mode of visualizing and exchanging various complex data resources based on computer technology. Compared with traditional computer systems, graphical interfaces, keyboards and mice, VR virtual reality technology has realized essential changes. . Under the traditional human-machine interface mode, the computer and the user are independent of each other, and the VR virtual reality technology integrates the two to produce and display the three-dimensional image, and at the same time realize the environment modeling and recognition and positioning, and generate in the computer system. In a specific environment, the user can use the data glasses, data gloves and other equipment to operate and control the surrounding environment, achieve the preset goals, and obtain the required feedback information. In the actual application process, the modeling system obtains the three-dimensional basic data from the various components of the real environment, establishes the corresponding model, and generates different forms of environment. After the user's operation commands are recognized by the system, the control module and The sensor acts directly on the virtual environment, and the sensor system can deliver changes to the environment to the user in a timely manner. VR virtual reality technology and CAD technology are quite different. VR virtual reality technology is an interactive display mode, which has high requirements for visual, auditory and tactile input. CAD technology mainly uses modeling system to formulate product structure. , real-time interaction is not possible. Under the CAD technology mode, the designer is in a passive observation position, and the VR virtual reality technology designer is in an active state, and the specific graphics formed have a sense of depth and realism, and the technology can be used to manage the life cycle of the agricultural product, and can realize different products. Develop at the same time.

4. The main features and representative software of VR virtual reality technology

VRED is the most representative software of VR virtual reality technology. The software is widely used in automobile companies such as BMW, Audi, Volkswagen, Porsche, Nissan and Mercedes-Benz. It brings design concepts, production and marketing to the enterprise. Comprehensive innovation. The software has many easy-to-use tools and functions to save users time. The software can be used in car styling to show the material effect, body color and lighting effects of car styling through VR simulation and animation. The detailed material simulation function of the software can present the most realistic material effects, enabling the designer to intuitively grasp the basic style of the material at an early stage, and discover various problems in the design in time [2].

At present, VR virtual reality technology mainly includes immersive virtual reality technology, distributed virtual reality technology, desktop virtual reality technology, users can fully immerse themselves in the virtual environment, it is difficult to distinguish the true and false of the environment, designers can fully devote themselves to three-dimensional The design process of the environmental system. At the same time, the virtual environment has strong interactivity, and users can actively change the environment and get a good experience. Many objective non-existent environments can be freely constructed in the virtual reality system. The virtual environment will change in the first time after the user issues the instruction. The designer can modify the data of each indicator in time, and obtain different solutions through input of different parameters. After comparative analysis, the best results are achieved.

5. The application of VR virtual reality technology in automobile design

VR virtual reality technology has the basic characteristics of immersive, and has been widely used in automobile design. The specific performance methods mainly include static and dynamic. The dynamic representation method is mainly camera animation, which performs comprehensive camera positioning according to the lens to be displayed, accurately records the position of the camera, edits with the animation editor, and obtains complete camera animation, and can also

display the angle according to the needs. Angle adjustment is performed to output a panorama of the Flash format. The high-end camera device is used to scan the scene in all directions, and the effect of real-time animation synthesis is obtained through data rendering. In the actual operation process, the actual measurement of the camera can be performed according to the specific scene, and the modeling is performed by using the three-dimensional software, and the scene is combined with the rendering data to output, and finally the desired scene is obtained. The application of VR virtual reality technology in car design can realize dynamic demonstration. The designer can understand the changes of the light and shadow system of the car while driving, and can adjust the light and shadow picture and body posture before adjusting the design plan, and adjust the characteristic line trend and posture. Save time in design development. The static representation method is to simulate the virtual prototype and the real environment, and evaluate the effects of different schemes, different scenes, different textures and different materials. The designer can accurately record the data resources of different versions and examine the virtual from different angles. Is there a problem with the sample car? Through the comparison between realistic materials, real light and shadow and 3D data, you can identify your strengths and weaknesses. According to the requirements of static detection, designers can make different scenes such as bridges, lakesides, review rooms, and roofs to ensure the effectiveness of virtual tests.

The main influencing factor of automobile aerodynamics is the body shape. At present, the wind tunnel test method is generally used to test the body shape and aerodynamic effects. Many automobile companies produce scale models such as solid vehicles to test in the wind tunnel test site. It is completely inconsistent with the physical size. There is often a large error between the actual situation and the test results. The direct use of the full body model requires the size of the wind tunnel to be too large, the structure is complicated, and the cost is too high. Many enterprises cannot reach this. A request. At the same time, once the overall design of the body changes, the company will re-create the model and conduct wind tunnel tests. Using the virtual wind tunnel formed by VR virtual reality technology, the designer can clearly observe the air flow in the virtual three-dimensional space, analyze the complex multi-vortex three-dimensional effect, understand the airflow damage turbulence generated by the air multi-circulation area, and the designer can obtain the station. In the real wind tunnel experience, the designer does not interfere with the airflow in the three-dimensional environment, and can deeply understand the dynamic characteristics of the body design. Using VR virtual reality technology interactive devices, designers can comprehensively modify the data and objects of the virtual environment, evaluate the ergonomics of the body and the aesthetic evaluation of the interior parts in the virtual environment, and the decision makers can also The vehicle model is reviewed to eliminate the cumbersome steps of the car sample production. The CAD digital model of the car body can also be updated and modified in real time to improve the scientific design.

The full-size body shape model requires the steel or wooden model skeleton. First, the foam is used to make the blank model. The surface of the model is made of sludge, the expected color is applied to the surface, and the interior part model needs to be made to determine the various parts of the body. Lines, and finally check whether the proportion of the various parts of the body is reasonable, whether it meets the consumer's visual habits, and the decision-makers decide whether to put into production through the review of the full-size model. The process of car model making adopts VR virtual reality technology to accept the financial, material and human resources of the enterprise. It can provide decision makers with multiple colors and schemes. It can also be modified according to the actual situation. The modeling cycle time is short. After determining the design plan. The various data of the modeling can be directly used in the body structure and stamping wedge design. The design of the various components inside the body can also be done with VR virtual reality technology. With the data glove, the door handle, hand control, windshield wiper, car radio, rear view mirror, indicator handle, steering wheel, seat, shift lever can be realized. , air conditioning and other components design [3]. In addition to aesthetics, the shape of the car also needs to meet the basic requirements of ergonomics, safety, assembly, production process, and maintenance. The design process is often limited by funding, time, production, etc., and can fully

meet the design by using VR virtual reality technology. Basic requirements.

The main problem of virtual reality technology is that it does not have enough realism. Especially for the effect of light and shadow, it is seriously out of the actual situation. The designer can't modify it in the physical structure, and the customer's evaluation opinions can't be accurately reflected. Therefore, the virtual reality technology is utilized. A physical model is required as an aid. In the design of two-dimensional system, it is necessary to focus on the angle and perspective. In the three-dimensional design, the line and turning point are considered. The three-dimensional model is used to make a detailed evaluation of the design, and the design is transformed into a specific sketch according to the physical model. Scientific and high-quality physical models can promote the continuous optimization of design solutions and ensure the rational development of design. Many auto companies need to use the clay model in the design process to stereoscopically present the graphic design to ensure that the designer can design according to the real car model. The car model has a three-dimensional and intuitive effect, is the focus of customer attention, has a strong visual impact, is the key link of various design ideas, the role of the model is irreplaceable in the entire design process.

The use of virtual reality technology for the development of new products in the early stage of automotive design can make various types of design solutions fully rendered, which is convenient for enterprises to select the optimal design, reducing the cost and time consumption of making different physical models. At the same time, virtual reality technology does not have a sense of reality. It takes a lot of work to produce related scenes and animation materials. After a full pre-assessment, physical model selection and final design plan need to be carried out to achieve the design level. Comprehensive improvement. Using virtual reality technology, designers can simulate a perfect car shape design and perform functional test data analysis to avoid various risk factors that may exist in the physical model design process and improve the scientific design. The combination of virtual reality technology and physical model can continuously update the review scene, and can effectively set the external environment of the vehicle and the specific color of the vehicle body, and combine dynamic and static to show the diversity of design schemes.

6. Conclusion

VR virtual reality technology belongs to a brand-new technology and is currently in the initial stage of development. This technology can realistically simulate the scene of car driving, and can realistically simulate various data parameters of the car, so that designers can find the car at any time. The design flaws are adjusted in time to avoid risks. Many world-class automobile companies are fully aware of the advantages of virtual reality technology. They have widely used this technology in the actual development of automobile design, and have achieved good results. Therefore, relevant enterprises should conform to the trend of the times and adopt virtual reality technology. Combined with physical model technology, the vehicle design capability will be comprehensively improved, and its comprehensive market competitiveness will be enhanced to achieve sustained and stable development.

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