

Application of CAD-Based Fractal Graphics in The Visualization Framework of Xinjiang "tukeche" Naan Stamp Design

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Abstract: With the development of the tourism industry, Xinjiang's natural scenery has been favored by many tourists. During peak tourist seasons, tourists are in an endless stream, and Xinjiang's "spit bus" has become one of the beautiful scenery. The traditional spit bus has a single structure and simple functions, and it gradually breaks away from the development of the times. Based on the CAD fractal graphics technology, this paper studies a new type of automobile structure-the Xinjiang "spit bus" naan stamp structure, which is realized by using the 3D design visualization framework of CAD graphics. The structural design, damping simulation and force analysis of Tubus, the result is optimized by 7.2%.

Keywords: CAD-Based Fractal Graphics, Visualization Framework, Naan Stamp Design, Take A Car

1. INTRODUCTION

Printing technology, this emerging high-tech product, the Internet and new energy, is called the three core technologies of the "third industrial revolution". This is considered to be after the steam age of the nineteenth century and the electrification age of the twentieth century. This is the third historic breakthrough that will lead a revolution in design, manufacturing, materials and even life in all fields of human society, allowing humans to cross the barriers of the real and virtual worlds, breaking the boundaries between technology and art, and setting off a global scale. The wave of innovation is of epoch-making significance [1-7].

For the automobile manufacturing industry, printing technology is not a new concept. Due to the limitations of computer technology, material science, Internet information and other fields, printing technology has quietly served the automobile manufacturing workshop in the past few decades. Has not been extensively developed and far-reaching influence. Until today, when there are major breakthroughs in various cutting-edge technologies, printing technology has just begun to play its huge potential and make extraordinary contributions to the further development of human civilization. Although China's automobile culture has a long history, the theory and design experience of automobile body forms are very lacking, lagging behind developed countries in the automobile industry such as Europe and the United States. Automobile is a modern industrial product. Due to its technical complexity and commercial secrets, it has caused certain limitations, making it more difficult to grasp the method of automobile body shape [8-12].

Chinese car designers want to create cars with world-class design levels. The shape language and methods of cars are problems that need to be quickly mastered and solved urgently. Today, we are in an era of perceptual consumption where natural culture is popular, and the research of bionic design is to satisfy people's emotional needs. In the field of automotive design, as a unique and widely used design method, bionic design will play an irreplaceable role. Bionic design is an excellent design method. Based on basic theoretical research, systematic method research, cognitive

psychology research, etc., after analysis and summary, some new ideas and methods that are beneficial to the bionic design of car body shape are obtained. In order to help car body shape design, the design theory we have formed through research in this area should be more systematic and innovative. The "learning from nature" and "the unity of man and nature" in Chinese philosophy are consistent with the concept advocated by the bionic design of the car body shape. That is the integration of technology and nature, and harmony between man and nature [13-18].

Bionics emphasizes the search for the balance between human and nature in the same thing. The purpose of bionic design is to meet people's physiological and psychological needs. The bionics of the car shape means that the car is full of life and vitality. The bionic design enables the form of the car body shape design has become unprecedentedly rich, and the shape bionic design is full of the infinite charm of nature, which satisfies the human yearning for nature. Through the imitation of the natural form or the capture of the instantaneous shape of the creature, the car body shape is directly inspired, which broadens the thinking in terms of practical and spiritual functions, and then through innovative practices, it promotes faster and better car body shape design develop [19-21].

With scientific development and technological progress, higher and higher requirements have been put forward for the structure of parts, and more and more parts with complex surface features have appeared. Rapid prototyping technology integrates three-dimensional CAD entities through the processing principle of layered manufacturing. Transform into two-dimensional data, perform plane processing and accumulate layer by layer to form the three-dimensional entity of the part. The forming principle of layered superposition of rapid prototyping technology ensures the smooth progress of the processing process of complex parts, but during the forming process of parts, due to layering the existence of a step effect on the surface of the part will affect the surface quality of the part, and even affect the performance of the part. The fractal theory is characterized by self-similarity, self-affine and fine structure, which breaks through the traditional Euclidean mathematics. The limitation of being able to generate regular graphics, taking the self-similarity

between the part and the whole of the entity as the starting point, it is believed that the relatively independent parts of the fractal system are to a certain extent the reproduction and microcosm of the whole, which is especially suitable for expressing traditional Euclidean Curves and surfaces that are difficult to describe in German mathematics [22-24].

2. THE PROPOSED METHODOLOGY

2.1 The Xinjiang "Take Bus" Naan Stamp Design

Based on the actual role and status of the car in real life, the car body shape design should strive to be relatively perfect, reflecting the artistry and science. Science and technology are the basis for the realization of artistic beauty. The car body shape bionic design should be based on science and technology. The prerequisite is that science and technology are the basis for the expression of bionic form, and perfect artistic expression without science and technology cannot be achieved. Therefore, the bionic design of car body form is an organic combination of science, technology and art. Realizing the beauty of any form of styling must rely on science and technology. Related scientific and technical support will ensure the diversity of morphological art design. This requires designers to innovate in the shape of the car body while meeting the existing manufacturing technology of body styling. The requirements of such a certain shape can be processed and manufactured.

Many of the styling schemes proposed in the early stage of car bionic design are very creative and meaningful. However, through understanding of the actual production process, we found that some schemes are difficult to realize their original ideas. Under the limitations of the actual manufacturing process, not all the car's bionic form can finally achieve the goal. In the bionic form design, because there are many organic curved surfaces in the form of the creature itself, this is a great challenge to the modeling design. Due to the limitations of processing technology and materials, we may not be able to fully realize all bionic designs in terms of manufacturing, which requires us to develop morphological bionic art creation on the basis of existing technology. Nowadays, body materials are constantly developing, and many new manufacturing processes are constantly being developed, which expands the space for shape bionic design, and makes the current car body shape present a rich and diversified development trend, which solves many practical problems for people. However, this is a kind of limited satisfaction. After all, the development of manufacturing technology requires a long period of time, a continuous process of practice, exploration, and development, and it is also closely related to the development of other related disciplines. Therefore, the bionic design of the car body shape should take into account the art of modeling, and considering the existing manufacturing technology and process level, we must consider the practical feasibility of various bionic shape designs.

2.2 The Automobile Design Visualization Framework

The design process of automobile exterior styling design also starts from the initial hand-drawn sketch for automobile interior styling design, as shown in the figure. The picture shows one of the application schemes of printing technology in automotive interior design. For automotive interior design, the choice of different materials, the coordination of multiple colors, the assembly of various complex parts, the interactive

design of dashboards, and the human A series of issues such as the reasonable configuration of the engine system determine the extremely complex characteristics of the car interior design.

In the future, the development of printing in multi-material integrated printing and molding technology is likely to become more mature, which undoubtedly brings great convenience to the design and manufacturing of automotive interiors. With the gradual subdivision of the automobile market, the classification of functional vehicles has become more and more detailed. With the emergence of various vehicles such as commercial vehicles, RVs, and cities, although the development of interior functions is gradually improved, there are still many products. Due to the technical level and performance limitations of the production equipment, the machine itself cannot be flexibly adjusted to meet every user's use needs. Many times users can't laugh or cry when using the product, and even bring a lot of unnecessary trouble. People are always accustomed to adapting themselves to the product, but they rarely consider their subjective feelings in the process of using the product. In "Emotional Design", based on the three different dimensions of instinct, behavior and reflection, the Ph. Feeling joyful" In order to allow people to have a better product experience, technology may change this status quo. The case shown in the figure shows the research on the functional role of printing technology in future car interiors. The printing technology can realize the printing of the internal structure of the complex interior of the product, so that a certain structure cavity is formed in the wall of the car body for arranging various in-car service equipment. At the same time, it does not destroy the shape and structure of the outer wall of the car, so that the inner and outer walls of the car are integrally formed. This technological breakthrough overcomes the limitation that the traditional processing method can only be processed in sequence.

The structural optimization design of automobiles is a more mature technical means compared with other technologies. At the same time, it is also the earliest optimization technology used in various automobile lightweight technologies. As early as the 1970s, computers developed rapidly, and many new computer hardware and software were further improved. Therefore, for the first time, American automobile companies used computer software in the design of their cars. Later, with the emergence of automobile lightweight theory and corresponding computer design software.

2.3 The CAD Fractal Graphics

In recent years, fractal theory has been introduced into the field of rapid prototyping, and the use of fractal theory to optimize and improve rapid prototyping technology has provided new ideas for the development of rapid prototyping technology. At present, the application of fractal theory in rapid prototyping is reflected in the following three aspects. In Application in parts processing in the rapid prototyping process, according to the characteristics of the sliced data of the CAD model of the part, the fractal theory uses the recursive function system (IFS) algorithm to construct a square on the CAD outline, and divide each side of the square into three equal parts. Divide into 9 squares of equal area, discard the small square in the center, and then process the remaining 8 in turn to generate the layer characteristics of the Sierpinski carpet.

Then use the method of path cross-section stretching to generate a three-dimensional model of the Sierpinski carpet,

and use the RP system to process a three-dimensional entity. Due to the change of the material form during the rapid prototyping process, such as the stereolithography processing (SLA) material changes from liquid to solid. In the selective powder sintering process, the materials are melted and solidified. The changes of these materials cause the shrinkage deformation and thermal deformation of the parts. Therefore, it is necessary to optimize the scanning path and reduce the influence of the processing process on the accuracy of the parts. For example, the Peano fractal curve is used to generate the scanning path. A continuous polyline connecting all the square center points in the area to construct a rapid prototyping scan path

3. CONCLUSIONS

Then use the method of path cross-section stretching to generate a three-dimensional model of the Sierpinski carpet, and use the RP system to process a three-dimensional entity. Due to the change of the material form during the rapid prototyping process, such as the stereolithography processing (SLA) material changes from liquid to solid. In the selective powder sintering process, the materials are melted and solidified. The changes of these materials cause the shrinkage deformation and thermal deformation of the parts. Therefore, it is necessary to optimize the scanning path and reduce the influence of the processing process on the accuracy of the parts. For example, the Peano fractal curve is used to generate the scanning path. A continuous polyline connecting all the square center points in the area to construct a rapid prototyping scan path

4. ACKNOWLEDGEMENT

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