

Research on the design and Creation of contemporary Powder enamel based on NURBS modeling method

¹Dong Cheng

¹Jingdezhen ceramic university science and art college

Abstract: as an important discovery of ceramic design, contemporary ceramic design must be able to keep pace with the development of the times, learn to actively introduce new elements into the creation. This paper attempts to carry out the research of contemporary ceramic design and creation based on NURBS modeling, which is to integrate digital technology into the traditional ceramic design, and use NURBS modeling to innovate the decoration design of contemporary Famile-rose porcelain, so that the pastel porcelain works have a stronger sense of the times.

1 Introduction

NURBS is the abbreviation of Non-Uniform Rational B-Splines, which refers to a method of modeling curved objects. Using this method, we can make a variety of complex surface modeling and performance of special effects, in the current advanced three-dimensional software support is quite high, the advantage is that it can better control the curvature of the object surface than the traditional mesh modeling method, so as to create more realistic and vivid modeling. [1] In daily application, it is more used in aerospace, automobile and other modern industrial design. It is indeed an innovative design method to apply this modeling method to the traditional ceramic design. Its powerful surface modeling system has good basic functions such as sweeping, skinning, revolve surface and extrude surface. In addition, the surfaces can be connected, trimmed, deformed and simplified, which can well express the ideal 3D model. [2] Its application in ceramic design can play a very important role in the production of ceramic products in the later stage, so it is a very good design tool. Based on this, this paper focuses on how to use NURBS modeling to improve the design and creation of contemporary porcelain.

2 Characteristics of contemporary Famile-Rose Porcelain

Famile-rose porcelain, originated in the Qing Dynasty, refers to the decorative art of overglaze color created on the basis of ancient color painting by using enamel production technology. Many contemporary powdery porcelain creators continue to innovate on the basis of tradition, integrating tradition and modernity, so that the composition of the picture not only has a strong flavor of

traditional culture, but also has a distinct flavor of modern art. Composition is an important factor to form the formal beauty of pastel porcelain. The composition form of pastel porcelain in each period has distinct characteristics of The Times, which fully reflects the aesthetic taste and the spirit of The Times at that time. It is the only way for the survival and development of traditional art to innovate on the basis of tradition and make contemporary pastel porcelain fit for modern people's aesthetic taste and avoid conformism. But in a word, the creative spirit of ceramic creation cannot be changed. To some extent, pastel porcelain is a unique Chinese art, which is completely different from western still life painting. The most important thing in the so-called "combination of Chinese and Western" is how to refine western things and transform them into the characteristics of local culture. Some contemporary pastel ceramic works overvalue or even exaggerate the value of individuality. So that many people believe that anything unique and unique will be good and valuable that pastel ceramic painters also spend too much time and energy exploring the unique and extreme personal forms of expression. But not all individual forms of expression are worth our time and effort to appreciate. Tradition, as a collection of thousands of talents, is worth learning and studying more. Compared with the traditional famile-rose porcelain, the contemporary famile-rose porcelain, on the basis of inheriting the tradition, has created new technological methods, expanded the decorative subject matter, used various decorative forms, and paid attention to the unity of the form and content of the works. It is richer and innovative in content, form and technique than traditional famile-rose porcelain. [3] Specifically, it is reflected in the following points:

First, the theme is distinct and the style is outstanding. Content creation is a key point of contemporary pastel porcelain creation. The works that grasp the characteristics of the times and show the style of the

1910012008@stu.jci.edu.cn

times are undoubtedly works with distinct themes and the brand of the development of the times. Compared with the traditional pasteurized porcelain creation, the contemporary pastel porcelain creation has removed the traditional expression of deified legend and supernatural legend, and focused more on highlighting the content of realistic style flavor, which makes the works richer in content level and more profound in thinking realm in addition to the sense of the times.

Second, there are various forms of decoration. It is mainly reflected in the following five aspects: general decoration, landscape decoration, lighting decoration, floor decoration and scattered decoration. For example, the innovation of patterns and patterns, the innovation of leaving blank implication and so on. Combined with the main content of this paper, contemporary famille-rose porcelain can actively use modern technology to create works with more imagination and artistic expression.

3 The bottleneck of contemporary porcelain design

After the reform and opening up, the development trend of contemporary powder enamel is obviously diversified. Especially after entering the 21st century, with the deepening of globalization, the characteristics of diversification are more obvious. At the same time, many contemporary powdery porcelain creators are not willing to adhere to the tradition, keep pace with The Times, and innovate with great determination. With the progress of society, the improvement of people's living standard and aesthetics, the quality of people's spiritual life is also getting higher and higher, and the aesthetic taste is also rising day by day. People's requirements for artistic taste have also changed quietly, which brings new requirements and challenges to ceramic artists. Modern ceramic art creators in-depth close to real life, out of various bondage, is no longer a mere blind pursuit of art, but joined the personal emotion, in succession on the basis of traditional powder enamel craft, in the process, material, craft, material breakthrough and innovation, the modern pastel decorative art and contemporary aesthetic organic union, make work has strong characteristics of The Times and the modern breath. Therefore, while drawing on the essence of traditional techniques, artists continue to conduct various experiments to find techniques and artistic expression media that can give full play to their artistic expression and specialty display. Through the exploration and development of new techniques and new materials, the improvement of tools and the transformation of ideas, a new world of art display of ceramic powder enamel is created, and a unique ceramic decorative art language is formed, which is exactly the artistic spirit we need in this era.

Their works have distinct personalities, which makes them enter the era with soaring personalities. Under the influence of diversification and individuality, the composition of contemporary pastel porcelain shows rich and varied characteristics.

Contemporary Famille-Rose Porcelain Creation has experienced many transformations in the process of

development. Before the 1980s, it was mainly reflected in the content design, showing strong realistic style theme works; by the end of the 1990s, the content design of traditional Pastel Color began to make a comeback; after entering the new century, it began to make breakthroughs in the form of technology and decoration techniques; so far, the contemporary ceramic design still expected to be able to continue to innovate, but lack of a breakthrough. Before that, both the content design and the decorative form design have been reformed. Therefore, many potteries and academic scholars are looking for a better breakthrough in the unique design of pottery, in order to radiate the new vitality of contemporary pastel porcelain creation.

4 Research and demonstration of contemporary ceramic design based on NURBS modeling

In this paper, the NURBS modeling method is a kind of computer software technology of modeling design. In ceramic design, the free-form surface modeling function of NURBS can be used to express the contour and shape in the internal construction space, providing excellent data and shape for the final excellent works. Therefore, NURBS can play an important role in the early conception and scheme implementation stage of ceramic and sculpture modeling. [4] the application of NURBS in the design and creation of contemporary famille-rose porcelain can improve the content of the decorative form of famille-rose porcelain and enhance the creative effect of the works.

The most advantage of NURBS modeling is the performance of complex surface modeling, that is, we often refer to the profiler. Therefore, we can make full use of this feature to create a special artistic expression effect in the design of Famille Rose Porcelain shape. For example: in the design based on NURBS modeling method, the first step is to import. Through the command of creating NURBS curve tool, we can get the surface modeling line data of the required shape, read the line data contour line, use the rotation command to make the initial model, and adjust the irregular curve surface by fine tuning the points on the curve. At this time, we need to pay attention to the module that can modify the rotating surface. Secondly, NURBS modeling is used to create the smooth surface of the model to complete the 3D model. Use CV Curve Tool to adjust right angle and chamfering to draw contour line more finely. Thirdly, the thickness of the model is solved according to the author's design requirements, which also directly affects the intuitiveness of the finished product. The whole operation includes rotation command, axis preset, crankshaft, start and end scanning angle, segmentation, curve range, output geometry and other parameters. The difficulty lies in the fine drawing of contour line. NURBS curve has three kinds of equivalent curve representation, such as rational fraction and rational basis

$$\text{function: } P(u) = \frac{\sum_{i=0}^n w_i d_i N_i, k(u)}{\sum_{i=0}^n w_i N_i, k(u)}$$

$$P(u) = \sum_{i=0}^n d_i R_i, k(u)$$

The latter formula is,

$$R_i, k(u) = \frac{w_i, N_i, k(u)}{\sum_{j=0}^n w_j, N_j, k(u)}$$

$$P(u) = H\{P(u)\} P u \frac{\sum_{i=0}^n w_i d_i N_i, k(u)}{\sum_{i=0}^n w_i N_i, k(u)}$$

In the specific application process, the surface shape of ceramic shape can be modified by changing the parameter data. For example, given a surface parameter $s^\circ(u, v) = s(u, v) + d \bullet N(u, v)$ The contour

form: curves are separated by parameter changes, and then these curves are decomposed into component segments, and then each isolated curve is designed to realize the surface modification. The change process of these parameters is as follows:

$$s(u, v) = \frac{\sum_{i=0}^m \sum_{j=0}^n w_{i,j} p_{i,j}(u, v) N_{i,p}(u) N_{j,q}(v)}{\sum_{i=0}^m \sum_{j=0}^n w_{i,j} N_{i,p}(u) N_{j,q}(v)}$$

$$u \in U = \{ \underbrace{a, a, \dots, a}_{p+1}, u_{p+1}, \dots, u_n, \underbrace{b, b, \dots, b}_{p+1} \}$$

$$v \in V = \{ \underbrace{c, c, \dots, c}_{q+1}, v_{q+1}, \dots, v_m, \underbrace{d, d, \dots, d}_{q+1} \}$$

Figure 1. The change process of parameters

Finally, the effect of surface modification is shown in the figure

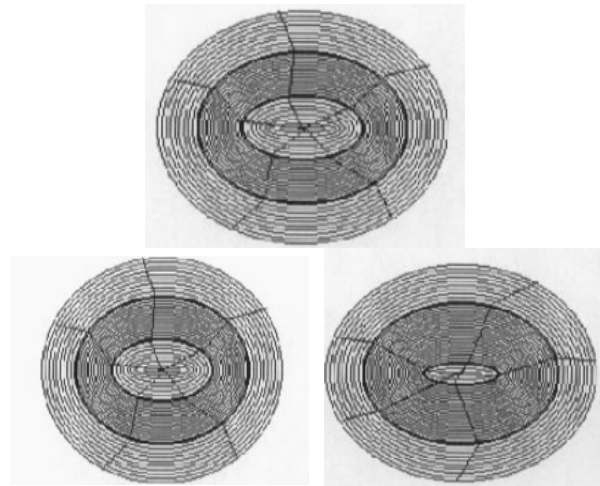


Figure 2. The effect of surface modification

5 Conclusion

Under the present situation, we should start from multiple angles, fully explore the characteristics of pastel porcelain, form our own artistic style, and make it have more space for development. I believe that with our efforts, the powder enamel will have a further development. Modern powdery porcelain decoration is still in the process of change and development, and its modernity is constantly strengthened, and will form an independent system soon. Pastel is a mature painting of ceramic painting, which means that it has internal logic: the so-called extension, the so-called promotion, will only be an extension in line with ontology logic. At present, our ceramic artists more facing a new historical mission, should according to the characteristics of the ceramic carrier this art, take its director and collect fresh vivid material, extensively absorb the beneficial experience of ancient and modern, Chinese and foreign and nutrition, constantly to break old patterns, develop national art tradition, according to the aesthetic characteristics of the famille rose porcelain, create more new theme, artistic conception and new techniques and forms are excellent new famille rose porcelain works.

The development of any art needs to keep pace with the development of The Times and can reflect the strong voice of the changes of The Times. The development of ceramic art must follow this law. As an important part of ceramic art, the creation of contemporary pastel porcelain needs to enrich the vitality of The Times to expand its artistic expression. Therefore, the active use of NURBS and other modern technological innovative works of creation and design is the only way for the future development of ceramic creation.

reference:

1. Wu Ting, B-spline method and its application in CAGD [J], master's thesis of Anhui University, 2015
2. Bao Weining, Huang Weiping, application of non-uniform rational B-spline theory in freeform surface modeling, Journal of Jiangnan University,

March 2005

3. Xu Li, Chen Chi, Fu Xiaorui, analysis of the characteristics of Famille Rose Porcelain and modern Famille-Rose Porcelain in Qianlong period [J], Journal of Jingdezhen University, 2012, 27 (2): p130-p131
4. Rao Shun, practical research on free form surface based on NURBS in ceramic modeling design [J], Journal of Ceramics, 2011.06: p289-p293
5. Peng Guohua, NURBS principle and its application in modeling [J], master's thesis of Northwest Polytechnic University, 2001