

Research on Innovative Design of Ceramic Products for Daily Use

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Abstract—Among various categories of ceramics, daily ceramic products play an increasingly important role in the field of ceramics, so the in-depth study of it also highlights its importance. Innovation is the eternal topic of daily ceramic product design. The quality of product design determines the product life cycle, market consumption, manufacturing and other links. Based on the importance of innovative design, this paper discusses the innovative design of daily-used ceramic products from the perspectives of functional innovation, shape innovation and material innovation.

Keywords—ceramics for daily use; function; form; texture; material; innovative design

I. INTRODUCTION

Ceramics are the crystallization of earth and fire. The progress of society, the development of technology and the constant change of life style have promoted the production and development of daily ceramics. Ceramic has been closely related to daily life since its birth. In the development of history, ceramics, like other kinds of craft, experienced ups and downs. Until now, the application of ceramics in the field of daily use has become more and more obvious and extensive. Daily-used ceramics have a unique position in daily necessities with its unique "practical, beautiful and cheap" characteristics. In today's information society, although the design of daily-used ceramics is not as frequently updated as the design of other fields, the development of its design is still inseparable from innovative thinking, innovative methods and innovative concepts. This article carries on the thorough exploration to the innovation through each element which relates to the daily use product design.

II. FUNCTIONAL INNOVATION DESIGN

The design of daily-used ceramic products is human-centered, with emphasis on the function of the material system on the outside and the ability to produce such a function. Therefore, product function refers to the utility of the product on people. [1] Every piece of porcelain for daily use has different functions. When people use it, they can meet their needs through its functions. The function of daily-used ceramic products can be divided into using function, cognitive function, aesthetic function and symbolic function. Therefore, functional innovation design can be developed from these four aspects.

Using function refers to the ability of the product to meet people's certain use needs, also known as material function. It directly meets people's certain material needs through the exchange of material and energy between the design object and people. For example, clothing is used to cover body, car for travel, air conditioning for cool, etc., these belong to the use function of the product. It is the basis of product survival and the basic function of daily ceramic product design. The usability of functions is an important part of product using functions. Usability is an important aspect of availability, which means that the product is easy for users to learn and use, can reduce the burden of memory, use satisfaction, etc. The functional design of ceramic products for daily use should cover ease of use. Design should not only focus on the function of the product, but also be humanized and meet the unity and coordination of "product-people-society-environment". [2] For example, the design of the teacup should take into account whether the capacity is suitable, whether the proportion of the cup size is in line with the man-machine relationship, whether the handle thickness is convenient to take, whether the cup is easy to clean after using, and whether it is hot after making the tea. The usability of product functions should consider not only human physiological characteristics, but also human psychological characteristics. "Fig. 1" shows the design of double-layer insulated porcelain cup of Bodum Canteen in Denmark, which has good thermal insulation performance in function and can also effectively protect hands. On the basis of satisfying the function of using the product, the product is endowed with good experience of using, thus achieving harmony between human and product.



Fig. 1. Double-layer insulated porcelain cup of Bodum Canteen.

At present, due to the limitation of modeling, the use function of most daily-used ceramic products is very single. For example, plates can only be used to hold food, and

teapots can only make tea, and so on. Such ceramic products for daily use with single function can no longer meet people's needs of increasing diversification. In view of this kind of circumstance, when designing ceramic products for daily use, some designers consider to diversify the use function of porcelain products for daily use, so as to realize the purpose of "multi-purpose of one thing". For example, "Fig. 2" shows a cigarette set designed by the designer Makoto Komatsu (Japan). It consists of a tray and several cigarette holders, which are very flexible in use. These can be put together or separated, picked up or placed on a table, and there is no limit to the number of them. This reflects the designer's view of life and the new lifestyle. "Fig. 3" shows the design of mug. The ingenious part of this work is that it can be put sugar or sugar bag on the handle, which is very convenient and enhances the practical performance of the product.



Fig. 2. Cigarette set.



Fig. 3. The combination of sugar and cup.

Cognitive function not only meets people's needs to use products, but also satisfies people's spiritual needs to a certain extent. For example, a product's buttons, brand, interface, and so on can help people understand the performance and use of the product. Only by recognizing what the product is, how the buttons operate, and understanding the purpose and meaning of the product, can people create aesthetics through cognition and use. Therefore, the cognitive function of the product is to tell people through the modeling language of the product: what is this? What is the use? How to operate? It is the precondition to realize the practical function and aesthetic function of the product. For the design of daily-use porcelain products, it is very important to recognize the cognitive function of daily-use

porcelain products. Daily ceramic products are different from artistic porcelain. Artistic porcelain focuses on ornamental value and artistry, while daily porcelain focuses on practicality, followed by ornamental value. Therefore, the cognitive functions of porcelain products for daily use, which are very complicated in shape and easy to be confused in use, should be clear to people, so as to avoid confusing consumers. In daily life, there are often times when guests are greeted or parties are held. Serving tea is the first thing you do when you get in. When there are three or five guests, they often forget which one they are using due to the excitement of chatting or the change of seats. In "Fig. 4", this set of cups is not easy to mix in use and has a good cognitive function. The design of the cup is very human, and the cup body is decorated with four easily distinguishable scales. When used by many people, it won't get confused easily.



Fig. 4. The design of cup.

Maslow, an American psychologist, divides human needs into six categories: biological needs, belonging and love needs, esteem needs, cognitive needs, aesthetic needs, and self-actualization needs. [3] With the improvement of people's living standards, great changes have taken place in consumers' consumption concept and aesthetic concept. The concept of consumption has changed from "waste elimination" to "eliminate aesthetically", which shows that people's pursuit of aesthetic functions of products is increasingly strong. Human needs change with the development of history, when the low-level needs are satisfied, there will be new needs. As Mo Tzu said: "Shi Bi Chang Bao, Ran Hou Qiu Mei; Yi Bi Chang Nuan, Ran Hou Qiu Li; Ju Bi Chang An, Ran Hou Qiu Le. (Food, clothing and shelter are the basic living requirements of human beings, which are gradually improved with the gradual improvement of living standards. However, people must first meet the minimum requirements of survival — food, clothing and shelter. And then pursue higher pursuits.)" [4] Due to the change of consumption concept, people pay more attention to the design of daily-used ceramic products with tension, rich rhythm and strong visual impact. It is hoped that the design of daily-used ceramic products will be ornamental and practical, with certain individuality and artistry. This is a SHANA disk designed by the Japanese designer Toshlyukl Kita. The plates can be shaped from small to large, and the plates can be stacked up to form a flower shape. (See "Fig. 5")

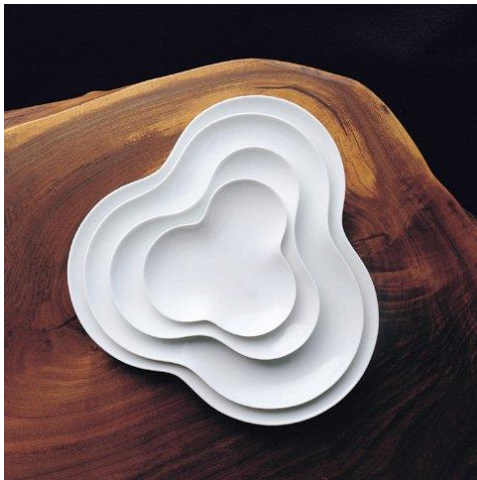


Fig. 5. HANA disk.

III. FORM INNOVATION DESIGN

In the dictionary of Contemporary Chinese Dictionary refers to the shape or manifestation of things. [5] The basic element of modeling is form. The appearance is the combination of the "shape" and "expression". From the design point of view, the form cannot be separated from the embodiment of certain material forms. The product form is always inseparable from the functions, structure, materials and other elements. In the process of using ceramic products, people are no longer satisfied with the material needs, but pay more attention to the spiritual needs of the products. Consumers' pursuit of design aesthetics creates the conceptual premise for the modeling style and form aesthetic feeling of ceramic products, and also puts forward higher requirements for the diversification of product modeling. As a result, the design of ceramic products for daily use tends to be diversified.

For a long time, the design of daily-use ceramic products is mainly based on batch, machine-made and standardized production, and handmade daily-use ceramic products account for a minority. Under the mechanized production mode, the ceramic is formed by mechanical compaction and gypsum mould grouting. Such method is convenient and fast, suitable for mass production and some products with simple modeling. However, the product that mechanization produces lacks individuality. The modeling of the product is drab, and too neat. In order to make up for the shortcomings of mechanized production mode, special-shaped design method can be adopted for daily-used ceramic products, which is helpful to change the deficiency of single modeling of daily-used ceramic products at present. Special-shaped design is not as standardized as mechanized production, and the modeling mode is flexible, which can be either bionic form or concrete form, or even the combination of concrete form and abstract form. Because of the complexity of the shape, the semi-mechanized production method is mostly adopted. That is, simple forms can be formed by mechanical pressing, and complex shapes can be shaped by hand kneading sculpture. This modeling method makes daily-used ceramics products break through the tradition in appearance,

effectively change people's inherent impression on modeling design, bring people fresh visual experience, enrich the modeling expression language of daily-used ceramics products, and make up for the deficiency of traditional modeling. Moreover, it has positive significance to show the personality and emotion of daily-used ceramic products. "Fig. 6" shows a work of Jianyi tea set. The side of the tea set is like Jupiter with a circular bottom and a good insulation function. The shape of this work breaks the traditional form of regularity, and there are arbitrary forms in the shape of the rules, thus forming the effect of changes in the uniformity.



Fig. 6. Jianyi tea set.

IV. INNOVATIVE TEXTURE DESIGN

The texture effect of daily-used ceramic products is just like human skin. The use of texture in the design of daily-used ceramic products can produce different aesthetic experience. People experience the elegance, comfort and closeness of ceramic materials through the effects of color, texture, shape, crossover, intricacy, continuity, overlap, density, smoothness and roughness of surface texture. In daily-use ceramics, the texture decoration of some teapots and teacups can be partially glazed. Through area contrast, size contrast, color contrast and smooth and rough contrast, and then form a unique aesthetic effect. "Fig. 7" shows a cup designed by Tichelaar Makkum. These cups have a unique texture effect, which is created by rubbing on materials such as tape, rubber, thread and orange peel. The texture effect created by hand marks gives warm emotion to the cold ceramics.



Fig. 7. Texture effect of the cup.

Ceramic textures are formed in a variety of ways and are still being innovated. The traditional advantage of ceramic materials over other materials such as wood and plastic is that their combination with glazes provides a permanent bond and decoration. Nowadays, traditional crafts have been

replaced by some unique ways. "Fig. 8" shows the design of flower implement. The inspiration for the decoration of the ceramic vase comes from the collection of ceramic works of art in the "princess court" museum in Lovalden, Netherlands. [6] The surface decoration of this giant prince flower ware uses brand-new technology, broke through the traditional



Fig. 8. Cotton thread embroidery "giant prince" porcelain flower ware.

In addition to the above two innovative methods of texture, you can also mix the colored material into the mud and mix two or more different colors of clay together. Then make it into shape, pouring a layer of transparent glaze, and waiting for the finished one from firing. The ceramic made by this method is called "marbled texture" ceramic, and it has an accidental, random and free visual texture effect. Due to the different ways of mud billet twisting, texture changes are also infinite. It can form wood grain, bird feather grain, moire fringe and flowing water grain, etc. Some are like old

glaze decoration, and adopted the technique combining with embroidery decoration. Embroidered ceramic vessels have created a new method of surface decoration, combining hard and soft materials to create a unique blend between two different materials and different crafts.

trees, with their roots twisted and knobbed, and some are like rolling mountains. The texture design is ingenious and varied. "Fig. 9" shows a series of texture vase designs, which are made with marbled texture and rich in texture. After being calcined by fire, the properties and state of "marbled texture" ceramic will change a lot: from soft to hard and strong, from muddy to porcelain, and from loose to firm and dense. The surface texture of ceramic products shows plausible aesthetic effect.



Fig. 9. Texture vase design.

V. MATERIAL INNOVATION DESIGN

Materials are the material basis of design of ceramic products for daily use. As the saying goes, "of nothing comes nothing", which shows the importance of materials. Material is the substance of all creation, without which no creation can be transformed into a product. The material of daily use ceramic product design is ceramic, and there are a lot of kinds of ceramic materials at present: common ceramic material, functional ceramics, composite ceramics, intelligent ceramics, environmental protection ceramics, advanced ceramics and so on. Abundant ceramic materials undoubtedly provide a good material basis for the creative design of daily-used ceramic products. The richness of materials is related to the diversification of product modeling and the possibility of whether the creative product design can be transformed into reality.

Traditional ceramic products are pure ordinary ceramic products. Contemporary, the development of science and technology makes a lot of products not only use a single

material to complete its modeling design and functional design. The combination of different materials in the same product is also evolving. At present, the materials used in the design of daily-used ceramics are relatively monotonous. Most daily-used ceramics are designed with ordinary ceramic materials. The monotony of materials limits the modeling of daily-used ceramics products, which leads to the lack of aesthetic changes in the modeling. As a result, the appearance design of daily-used ceramics products has been restricted to the traditional ceramic modeling. Combining daily-used ceramic products with other materials, such as metal, plastic, wood, fiber and so on, is conducive to expanding the space of daily-used ceramic design, and fully tapping the potential of ceramic materials and material expression. "Fig. 10" shows a "warm" series of tea sets and coffee sets designed by Tony Alversdom of Finland and Brin Keeney of Ireland for Tonfisk. This work is a combination of ceramic and cork material. The base of the cup is rolled into a cylindrical shape with a thin piece of wood. The cup is tightly covered, which can insulate the heat and act as a

handle. Tea set ingeniously integrates natural wood and cold ceramics, giving people a rich emotional experience.



Fig. 10. "Warm" series of coffee sets.

The combination of a variety of materials in daily-use ceramics is achieved through the grafting and inlaying between two materials, which are visible, intuitive and explicit combination of various materials. Besides, the combination of various materials in daily-use ceramic products can also be combined together through internal means, such as adding a mixture such as cement, glass, concrete block, etc. to ordinary ceramic materials. "Fig. 11" shows a series of experiments by designers Victoria

Rothschild and Anna Ashburn, using terracotta, glass, porcelain, cement and other materials. [7] These works completely break the traditional single ceramic material. The mixed use of materials enriches the modeling of daily-used ceramics and makes the texture of daily-used ceramics give people new visual experience and aesthetic experience. It not only extends the aesthetic form of the product, but also enriches the modeling language of the product, breaking through the limitation of ceramic itself for artistic expression.

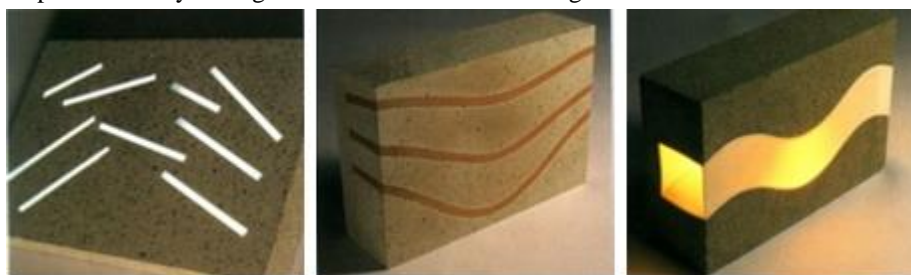


Fig. 11. Experiments of creation with mixed material.

With the progress and development of science and technology, a variety of new functional materials, environmental protection materials, composite materials continue to emerge, which brings new creativity and inspiration to designers, but also greater development space. With the appearance of new materials, ceramic materials are no longer confined to these daily utensils, and the application of ceramics in daily use will be more and more abundant. Some special ceramic materials will be widely used in every aspect of daily life, such as clothes, food, shelter, transportation, etc. Ceramics are everywhere from coffee cups to airplane parts. Many high-performance composite materials are used in rocket satellite, space shuttle and other fields. In addition, the development of special ceramic materials can solve the defects of ordinary ceramic materials. For example, "Fig. 12" shows a ceramic fruit knife made of high-tech nano-zirconia as raw material. It has high hardness, high density, high temperature resistance, magnetization resistance, oxidation resistance and other characteristics. It is known as a knife that never rolls, never rusts and never wears out. Its hardness is 50% harder than that of steel, and the tool uses nano ceramic materials to solve the problem of brittle ceramics.

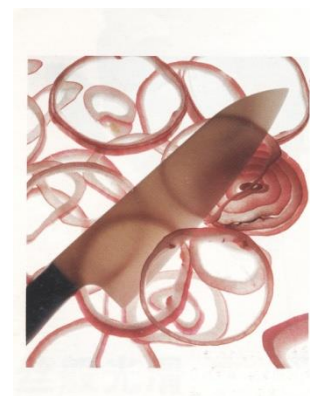


Fig. 12. Ceramic cutting tool.

VI. CONCLUSION

The design of daily-used ceramics integrates practicality and aesthetics. It is connected with people through the functions, forms, materials and structures of products and exists in the space and time of people. On the one hand, it constructs the human space; on the other hand, it is also the human mental representation. In today's ever-changing world, the innovative design of daily-used ceramic products is a

constant concern. Only through continuous innovative design can daily-used ceramic products meet people's growing spiritual needs.

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