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Aesthetic Research of Art Design Based on Technological Development

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***Abstract*—In the history of the development of art design, as one of the aesthetic categories of art design aesthetics, technical beauty develops with the development of technology. In different periods of technology development, technical beauty also presents different characteristics. This paper mainly discusses the technical beauty from the two aspects of handicraft period and industrial production period, deeply studies the technical beauty characteristics of art design in each period, and describes the vein of the development of technology beauty.**

Keywords—art design; technology development; aesthetics; technical beauty

I. INTRODUCTION

A. The Definition of Beauty and Aesthetics

The concept of beauty: beauty refers to a common essential attribute of objective things that can cause people's aesthetic feelings [1]. The beauty subject causes a psychological feeling. Aesthetics is a study of the specific psychological feelings of human beings. The subjects of its causes, essences, processes, etc. are mainly aimed at the aesthetic relationship between man and reality. Beauty has a basic characteristic: that is, beauty includes objective factors and subjective factors, and correspondingly, aesthetic activities also include two aspects of certainty and uncertainty, commonality and individuality.

The objectivity of beauty means that beauty exists objectively, and it is taken from the objective world [2]. Because of this objectivity, human beings have formed certain aesthetic psychology and aesthetic laws in the long-term process of transforming nature. For example, in the long-term practice activities, people have carefully observed the different combinations and relationships of natural materials, and believe that there are different forms of beauty laws, which are formed on the basis of human creation and summarization for thousands of years and have nothing to do with human will. The process of human cognition, judgment, and application of the nature, definition, feeling, form, and aesthetics of beauty is aesthetics. Aesthetics is a discipline that specializes in the laws of human aesthetic activities. The system it mainly examines is the interaction between aesthetic subject and object formed by the aesthetic feelings.

B. The Definition of Technical Beauty

Technical aesthetics is the product of the high development of modern production methods and commodity economy. It is the product of mutual penetration and integration of social science and technology science, and it is the combination of art and technology [3]. Technical aesthetics is the embodiment of aesthetic principles in the field of material production and life, and at the same time, it is a philosophical summary of design concepts in aesthetics. Technical aesthetics is highly integrated, which involves not only philosophical, sociological, psychological, and artistic issues, but also literature, semiotics, and various kinds of technical scientific knowledge [4]. Technical aesthetics was born as an independent modern aesthetics applied discipline in the 1930s. It began to be used in industrial production, so it is also called industrial aesthetics, production aesthetics or labor aesthetics; later, it was expanded for use in construction, transportation, commerce, agriculture, foreign trade and services. In the 1950s, Czech designer Petel Tuccier suggested using the name "technical aesthetics". Since then, the name has been widely used and recognized

by international organizations. In 1957, an international organization established in Switzerland was identified as the International Association of Technical Aesthetics. The name of technical aesthetics also has a customary nature in China, including industrial aesthetics, labor aesthetics, commodity aesthetics, architectural aesthetics, and design aesthetics and so on.

II. The Relationship Between Technology and Technical Beauty

The relationship between technology and technical beauty: With the advancement of technology in different eras, human beings use technology as an extension and supplement of the body, senses and brain, constantly expanding their range of activities and creating more things, which not only shapes the way people exist, but also changes people's aesthetic vision and provides new aesthetic value. The early porcelains made by humans, the emergence of later cars and aircraft, the Internet that extends to every corner of the world nowadays, and the widespread use of biotechnology are all best examples. Therefore, the technical beauty is not only an aesthetic form created by human society, but also the most close and universal aesthetic existence with human beings [5]. The essence of technical beauty is the use of the mastery and application of the laws of nature, through the image that people can perceive, to show the regularity and purpose of the object. Whether it is handicrafts or mechanical products under industrialization, the content can be regarded as the functionality and usefulness of the object. The function must be expressed through a concrete and vivid image that can be perceived by human beings, which constitutes the technical beauty of the object. Then, the specific performance of technical beauty in different technical forms is different.

III. Characteristics of Technical Beauty in Each Period

Historically, the object of technology is often the material achievements in the field of technology, such as the technology of the craft era, the industrial production technology of the big machine era. With the development of science and technology, in the era of entering the information age, the object of technology has also extended to the non-material field, especially the artificial information world that is consistent with meaning. In the initial improvement of tools and production techniques for efficiency, humans have gained the first sense of beauty. This article will discuss the technical beauty of the handicraft period and the technical beauty of the industrial production period.

A. Characteristics of Technical Beauty During the Handicraft Period

Traditional handicrafts, which are crafted by hand labor to create arts and crafts with unique artistic styles, contain the craft culture of the beginning of human civilization, and are an indispensable part of traditional culture. In the traditional agrarian age, technology emerged in the form of crafts, which are characterized by:

1) The technical beauty of the craftsmanship period has personal subjectivity:

Since handicrafts are often hand-made by individual artists, the technology is based on the individual's intuitive feelings and production experience, so the producers will naturally scale relations, rhythms, proportions, etc. with a tendency of beauty during the operation. More specifically, the creator builds its own relationship with the outside world through the guidance of various internal organs in the sense of internal order, and uses their own isomorphism with the world to create a work of art with a harmonious beauty, which in turn enables people to obtain aesthetic pleasure from their works. It is easy to find this order beauty in woven embroidery crafts. In traditional Chinese handicrafts — Gu Embroidery, as shown in "Fig. 1", it can be seen that the stitch is complex and changeable. Generally, there are more than 10 kinds of stitches, such as Qi needles, Pu needles, Dazi needles, Jie needles, Dingjin, Dantao needles, and Kelin needles and so on. The various colored embroidery threads used in delicate Ming Embroidery are intermediate color lines other than the pure colors that have not been seen in Song Embroidery. In order to more vividly express the rich color effects of landscape figures, insects, fishes, flowers, birds and other layers, Gu Embroidery uses various middle tones such as the old and tender, dark and light of the scene for complementary color and color register. Thereby fully expressing the natural scenery of the object. At the same time, Gu Embroidery uses the masterpieces of landscapes, flowers and birds, and figures in the famous paintings of the Song and Yuan Dynasties as the transcripts. The pictures are all combined with embroidery and painting, using embroidery to replace the painting, which is also the most unique part of it. This unique embodiment is commonplace in handicraft. It derives from the experience gained by human beings' long-term direct contact with materials, allowing the creator to clearly visualize complex patterns in manual operations before production.

Fig. 1. Chinese traditional embroidery — Gu Embroidery.

2) The technical beauty of the handicraft has greater autonomy and flexibility:

Due to the natural order and rhythm derived from the living body, handicrafts are obviously more "active" than mechanical products, unlike mechanical products that are rigid and rigid, it has certain independent and flexible

features. For example, the Portland vase, see "Fig. 2", is made by materials called "jewel embossed glass." This method draws on the technique of gem carving. Firstly, the dark glassware that has just been produced is immersed in white molten glass to form a light-colored appearance, and then it is took out; the spare parts of the surface white glass layer is removed immediately after cooling and it reveals a dark background, thereby forming a light, embossed and decorative pattern. John Ruskin always praised craftsmen when criticizing machine-made "inanimate" products: "When a skilled craftsman is making a piece of work, if his hands are moving with his breath or heartbeat, his work has a 'rhythm', and the things he engraves or draws will be full of life".

Fig. 2. The Portland vase.

3) The technical beauty of the craftsmanship period is also paying attention to "teaching someone according to his aptitude", that is, applying the corresponding processing skills according to the material characteristics:

In the opening of the "Zong Lun" of the earliest handicraft technical literature in China — the "Kaogong Ji" in the Spring and Autumn Period and the Warring States Period, it records the principles of craftsmanship design and production: "The weather is limited by the seasons; the land is limited by the climate; the materials include both good and bad parts; the craftsmen have skillful and unskilled ones, and a product that combines the good side of these four can be called a qualified one." In this sentence, it emphasizes the combination of nature, geography and material characteristics, and then exerts it in technology to achieve excellent results as well as to obtain the beauty of the handicrafts with regularity and purpose. People commented Jingdezhen ceramics, as shown in "Fig. 3", that "they are as white as jades, as thin as papers, as bright as mirrors and as transparent as beating a chime". Jingdezhen ceramics melt the craft, calligraphy, painting, sculpture and poetry in a furnace, which are indeed more precious than jewels, brighter than mirrors, as good as Jing Hao and Guan Tong's paintings, and as great as Sushi's calligraphy. Elegant and beautiful blue and white flowers, colorful paintings, gorgeous and magnificent glazes, dainty and exquisite egg-shell porcelains, exquisite sculptures, all are the treasures of traditional culture and art. During the Qianlong period, Jingdezhen had many porcelain kilns with wide distribution. In addition to the royal kilns, there are two or three hundred of folk kilns, and there are tens of thousands of craftsmen. The blue and white porcelain produced during this period is clear and clean, and the color is bright blue and beautiful, giving a fresh and bright feeling to people. The colorful porcelain is strong colored and magnificent, and it has also developed compared to the Ming Dynasty. The rose porcelain created is soft, with distinct layers and three-dimensionality. In the porcelain embryo, Western oil paintings are used to stimulate the drawings, and then the enamel porcelains will be made by kiln firing, merging into the Chinese and Western, which are particular exquisite and beautiful and are exclusive goods of the ancient Chinese imperial palace.

Fig. 3. Jingdezhen ceramics.

B. Characteristics of Technical Beauty During Industrial Production Period

In this society where art design products are ubiquitous, a special form of aesthetics is getting more and more attention. It was born in the era of machine industry in the beginning of industrialized production. It has experienced the influence of "The Arts & Crafts Movement", "Art Nouveau", decorativeism and modernism, which has become increasingly perfect and full. This is exactly the technical beauty [6]. On the one hand, it has created a more humane technology; on the other hand, it has created a new form of art and beauty. Of course, it is an important form of aesthetics of art design products, and its characteristics are:

1) Industrial beauty is the most common beauty in the industrial production period:

The aesthetic existence of mechanical products can be realized through mass production of machines. On the one hand, the non-repeatable nature of mechanical products determines the narrowness of its beauty. The mass production of mechanical products has made the technical beauty more extensive, enabling more people to feel the existence and development of modern civilization. And it also benefits people, which is also an expression form of humanistic aesthetics. On the other hand, the mass production of mechanical products to adapt to the market's production also requires that the creative concept of technical beauty is the common expectation and common emotion of consumers. Although people have to infiltrate their

expectations and emotions when designing a product, this expectation and emotion must be consistent with the expectations and emotions of the most consumers. Design was defined at the International Mechanical Product Designers Conference in Belgium in 1964: "Design makes industrial products a unified whole that reflects both the consumer's point of view and the design and manufacturer's point of view." The industrial products mentioned here reflect both the consumer's point of view and the design manufacturer's point of view, meaning that the designer can only appear as a representative of the consumer.

2) In the industrial production period, the technical beauty is the unification of function and form:

Mechanical products always aim at the satisfaction of functions. Only when the functions of products are guaranteed, can technical beauty enter people's field of vision [7]. Of course, there is also an operational problem. Whether the operation is convenient, safe, simple, and comfortable has become an important criterion for measuring the technical beauty. Only mechanical products that are easy to operate and function well can give people a feeling of beauty. If a refrigerator can't be cooled and it is not convenient to operate, it is a failed technical product, and it is not qualified to enter people's aesthetic vision. However, if a product emphasizes functions blindly and ignores the aesthetic feeling of vision, the true technical beauty will not appear. For example, in the early 1953, Sony Corporation of Japan produced the "G" type tape recorder, as shown in "Fig. 4". This product is undoubtedly quite advanced in terms of functional technology, but at first glance, it looks like a prototype in the laboratory. Of course, such products are not technically beautiful.

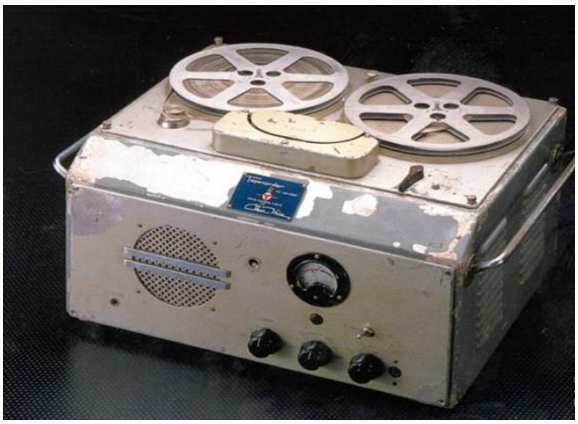

Fig. 4. The "G" type tape recorder.

In 1956 (24 years old) Rams and the head of the product design department of the Ulm School of Design, Hans Gugelot (1920~1965) designed a combination of a radio and a phonograph SK4 radio phonograph, as shown in "Fig. 5", which was dubbed "Snow White's Coffin" at the time because of its outstanding functionalist succinct modeling. It is this product that reflects highly rational characteristics and beauty, and a series of products that Braun subsequently launched created the era of German functionalist product design and became one of the most classic products in the history of design. Therefore, technical beauty is the unification of function and form, and there is no question of which is the dominant one. The harmony of function and form is the most essential feature of technical beauty [8].

Fig. 5. The SK4 radio phonograph.

3) In the industrial production period, the technical beauty is the fusion of new materials and new processes:

With the wide application of new technologies and new materials, new energy and new processes in actual production, the products have undergone miniaturized changes. For example, in the application of biotechnology and nanotechnology in the production field, for designers, they need to master the most advanced technology and materials, and these factors will affect industrial design and technical aesthetics. Therefore, the theory of technical aesthetics must be developed and innovated. The aesthetics of industrial products depend on the level of science and technology development, so the technical beauty has strong variability. Only when the level of science and technology develops to a certain extent, the technical beauty in the corresponding products can be realized and accepted by the society [9]. For example, the Danish designer Verner Panton designed the Panton chair in 1968, as shown in "Fig. 6". Its shape is unique, like the classic "S" as well as the flexible "5". The Panton chair is compression molding, and it has a strong sense of sculpturing with very beautiful color. It still enjoys a high reputation and is collected by many museums around the world. The Panton chair is made of glass fiber reinforced plastics, and the surface treatment is smooth and flat, achieving a reflective light effect. The back of the chair is as bright as the front surface, and the edges are symmetrical and uniform.

Fig. 6. The Panton chair.

IV. CONCLUSION

Regardless of the technical beauty in any period, it has its meaning and influence. With the development of technology, technical beauty will have new connotation and research value. Philippe Starck said: "Technology itself is not a terminal, but a means, the real goal, which is also the ultimate goal, is humanization, and the fundamental measure of humanity is caring [10]." The ultimate goal of the art design of the new era is also people-oriented, providing high-quality design results to make people's lives more comfortable and beautiful. But how to use aesthetic concepts and measurement methods to determine what standards are appropriate can't be measured by aesthetic quantification, instead, it requires the participation of both designers and others.

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