

Bionic Design-based Practice of Cultural and Creative Product Design

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ABSTRACT

The most basic bionic form of bionic design is to refine the forms of all things in nature and express the characteristics of people, animals and plants in a figurative and intuitive way. The seemingly simple lines actually demonstrate the magical structure of all things in nature and the designer's basic skills of refining forms and redesigning ability of integration and innovation. The design of the zodiac as the theme of creative products meets the needs of the market and caters to the psychology of consumers. The zodiac itself is based on animals and uses the morphological simulation of bionic design to design the shape characteristics of specific animals.

Keywords: *bionic design, cultural and creative product design, design ideas, practical method*

1. INTRODUCTION

Bionic design is a science, a scientific theory that combines bionics and design. It covers a wide variety of complex disciplines such as biology, ergonomics, engineering, aesthetics, and even mathematics. From oracle bone inscriptions to decorative patterns on living rituals; from simple animal furs to fashionable and beautiful clothes; from stone tools made for survival to mechanical production lines for industrial production; everywhere shows people's reliance on and aspiration for nature bionic. We have been living in the world of bionic design.

Bionic design is a high overview of animals, plants and natural forms in nature. Through the experience of living in nature, people gradually understood the meaning of existence of each member of the natural world and gave them their own spiritual aspirations. The research themes of bionic design include the shape and color of everything in nature, the sound perception of all living things, the structure and function of living things, etc. Combining bionic design theory in product design is a way to combine nature with human production, a way to achieve harmony and unity in the return of humans to nature.

The most basic form of bionic design is to refine the forms of all things in nature, and to express figuratively

and intuitively the characteristics of people, animals, plants and other shapes. The seemingly simple lines actually show the magical structure of all things in nature and the designer's basic skills of refining forms and redesigning ability of integration and innovation.^[1]

2. DESIGN AND CREATION IDEAS OF MODERN CULTURAL AND CREATIVE PRODUCTS

The design and creation of cultural and creative products should meet the common requirements of public aesthetics and emphasize innovation. However, we cannot innovate blindly and without basis. The root of cultural and creative products lies in "culture", and it is only by studying and summarizing "culture" at a deeper level that the products can have cultural transmission and spiritual inheritance.

The choice of themes, the themes of cultural and creative products in the modern market are mainly divided into museums, regional characteristics, cartoon games, etc. The market audience of various products has a certain crossover, but the market influence is very different, and people's desire to buy cultural and creative products determines the survival space of the products. Culture is carrying the historical heritage of a country and a nation, regional characteristics, customs, thinking and

even values, etc., which are unshakable, and the subject matter of cultural and creative products carries an important mission and responsibility.^[2]

The materials for the production of cultural and creative products are selected according to the cultural background, regional background and functional characteristics of different products, so that the cultural and creative products are more characteristic and full of cultural temperature.^[3]

Combining bionic design with cultural and creative product design is the demand of the market, using bionic design thinking to analyze product characteristics, inspire bionic inspiration, and guide design thinking deeply and effectively. From macro to subtle, cultivate focus on emphasizing ecological features applied to design. The flexible use of divergent thinking, sketching and trying more solutions in the creation stage to seek breakthroughs.

3. DESIGN PRACTICE OF BIONIC CULTURAL AND CREATIVE PRODUCTS

The theme of the design practice of the biomimetic products was determined as "Twelve Chinese zodiac signs".

It is recorded in the history that there were twelve Earthly branches in the era of the Yellow Emperor, and it is also related to the twelve constellations, and the twelve Earthly branches and twelve constellations in the old calendar represent twelve different months and seasons. The Book of Tang contains: "Crafty country with twelve things to chronicle the year, such as the year in the c, is said to be the year of the tiger." The twelve zodiac signs were also used by the ancients to chronicle the time of day and night as 24 hours, which the ancients divided into twelve hours. According to the habits of the twelve animals and daily activities of the hour, to determine the twelve zodiac represents the hour. Night 11:00 to 1:00 am, the next day, the son of the hour, is the time of frequent activity of the mouse, called "son of the mouse". 1:00 am to 3:00 am, the ugly hour. Cattle like to graze at night, cattle breeders are often late at night to feed cattle, called "ugly cattle". 3:00 am to 5:00 am, Yin time. Because of the fierce tiger day and night, the ancients often hear the tiger whistling at this time, called "c tiger". 5:00 am to 7:00 am, Mao time. Early morning grass with morning dew, rabbits like to eat at this time, so called "Mao rabbit". 7:00 am to 9:00 am, the hour of the star. At this time there is much fog, people aspire to the dragon in the clouds and fog, so called the "Dragon". 9:00 a.m. to 11:00 a.m., Si time. The sun is bright, the snake out of the cave to warm up for food, so the "Snake". Noon 11:00 to 1:00, noon. Passing wild horses in the noon time like running, so called "noon horse. Afternoon 1:00 to 3:00, untimely. A place called "sheep out of the slope", is the best time to herd sheep, so called "un-sheep". 3:00 pm to 5:00 pm, sheng time. The sun is to the west, monkeys like to cry at

this time, so "Shen monkey". 5:00 pm to 7:00 pm, the You time. The sun sets, the chicken in front of the nest, so it is called "you chicken". In the evening, from 7:00 to 9:00, it is the time of the 11th hour. The dog guards the house, so the "dog". Night 9:00 to 11:00, belongs to the Ohio time. Late at night, when the pig likes to arch trough, called "Hai pig".^[4]

Twelve Chinese zodiac signs: rat, ugly ox, ciger, rabbit, dragon, snake, horse, sheep, monkey, rooster, dog, pig. The ancients also used them as a way to chronicle the year, and the twelve Chinese zodiac signs can be said to carry a lot of weight in the hearts of the Chinese. Often people wear jewelry of their birth year zodiac as a souvenir, a symbol of good luck.

The design of the zodiac as the theme of cultural and creative products meets the needs of the market and caters to the psychology of consumers. The zodiac itself is based on animals, and the shape simulation of bionic design is used to refine the shape characteristics of specific animals and complete the design of the planar drawings.

Taking the Chinese zodiac horse as an example, the side silhouette of the horse's head is used as the basis of the overall image with bionic design thinking. Using artistic design techniques to refine the external shape, the horse's ears are shaped sharp and prominent forward, and resemble the image of the mythical unicorn, which is auspicious and holy. The shape of the horse's mane is borrowed from the flame shape, which is integrated with the horse's neck and is dynamic. The internal lines are outlined to resemble mountains and rivers. The entire handle is vibrant.

Taking the Chinese zodiac sheep as an example, the side silhouette of the sheep's head is used as the basis for the overall image using bionic design thinking. Using artistic design techniques to refine the external shape, the leading sheep's strong horns are used as the prominent feature, and a round moon shape is designed in a coordinated internal rotation, full and peaceful. The head of the sheep stands tall with its head held high, and has the imposing power of the head sheep. The overall structure is enriched by the two homeopathic lines at the neck, which gives the handle a sense of hierarchy and, on the other hand, makes it more varied in form, with the momentum of looking back at the moon.

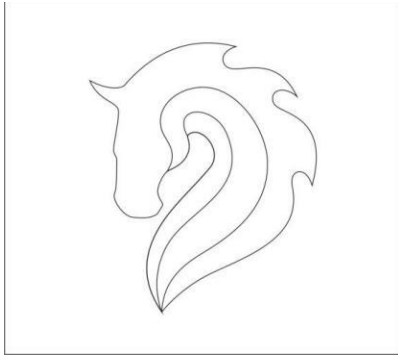


Fig. 1 Chinese zodiac horse graphic design

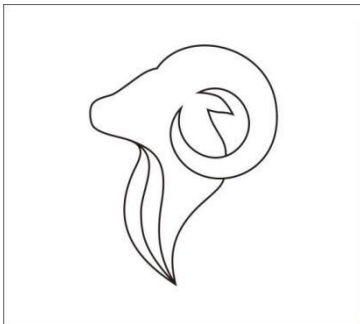


Fig. 2 Chinese Zodiac Goat Graphic Design

After completing the graphic design draft, start the selection of materials. The wood is the main wood handle, comprehensive material, color and other factors, the choice of mahogany is more suitable.

Use the carving machine to the selected material for processing carving. Carving machine selected brand Shixin 204 tooth machine and Hercules 90,000 rpm brushless machine.



Fig. 3 Dali King engraving machine



Fig. 4 Shixin engraving machine

The head of the knife is selected from wood carving head and nuclear carving head for shape carving and detail carving respectively.



Fig. 5 Wood carving head of carving machine



Fig. 6 Carving machine nuclear carving knife head



Fig. 7 Engraving process

After polishing and polishing, the final zodiac hand handle is completed.



Fig. 8 Finished Chinese zodiac horse hand piece



Fig. 11 Chinese Zodiac Goat Handle effect with one hand



Fig. 9 Chinese zodiac horse Handle effect of one-handed grip



Fig. 12 Chinese Zodiac Goat Scale Chart



Fig. 10 The finished hand piece of the Goat



Fig. 13 Horse Scaling Chart

The size of the Chinese zodiac horse wenjia hand handle is between 5cm-5.5cm, and the actual size of the Chinese zodiac goat is between 4cm-6cm. The main body is mainly curved, which is more suitable for holding in one hand, and can be used as an accompanying decoration and easy to carry.



Fig. 14 Chinese zodiac sheep side view

The shape of the Chinese zodiac sheep is a bit more complicated compared to the structure of the horse. As it is necessary to highlight the sturdiness of the sheep's horns and strengthen the three-dimensional effect, the façade is divided into layers: the face layer and the two sides of the sheep's horns layer, gradually raising the height of the layer from the position of the face to the tip of the sheep's horns in a smooth transition, forming a gently sloping spiral shape on both sides, three-dimensionalizing the sheep's horns and at the same time not weakening the strength of the wooden material in one stroke.

4. CONCLUSION

This practice of cultural and creative product design based on bionic design, using the Chinese zodiac horse and sheep hand pieces as examples, illustrates the importance of combining bionic design with cultural and creative product design, and verifies certain design-related theories through design practice. Biomimetic design is an expression and means to promote national culture and demonstrate cultural confidence.

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