Research on Stereo Image Modeling and Application in Coffee Machine Modeling Design

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Abstract. Through the research on the current situation and development trend of coffee machine industry, combined with the relevant elements of coffee machine modeling design, combined with the application status of stereo image modeling, an automatic coffee machine modeling is designed by using computer modeling software. The computer modeling tool provides a more efficient design means for the design of small household appliances, effectively reduces waste of time and resources caused by design deviation, shortens the design cycle, and better meets the needs of consumers and the market.

Keywords: Image Modeling · Coffee Machine · Design Practice · Design Efficiency

1 Introduction

With the progress of society and the change of people's values, people's emotional demand for product modeling is becoming stronger and stronger in addition to the useful function of products. This requires designers to find a balance between use function and emotional function, so that users can achieve spiritual enjoyment and psychological satisfaction. Interesting modeling design will make people deeply impressed by the corresponding brand or designer, so as to achieve brand effect. At present, the modeling design level of coffee machines lags behind. The fundamental reason is that most coffee machines copy foreign design concepts and technologies, lacking modeling innovation, and the design of new models has the problem of long design cycle and high investment cost. In the traditional design process, the scheme is designed by the designer and manufactured by the manufacturing engineer. The separation of design and manufacturing makes the designed products unable to meet the manufacturing requirements and need to be redesigned and remanufactured. This process increases the cost and cycle of product R & D, resulting in the situation that the profit is lower than the cost, while the labor cost and the cost of traditional marketing methods are also increasing, and the traditional design industry is facing great challenges [7]. This paper uses three-dimensional modeling technology, combined with the current situation and development trend of the coffee industry, This paper analyzes the relevant elements of coffee machine modeling design, analyzes the ergonomics, body material, modelling and other aspects, and carries out the design practice of coffee machine through rhino software.

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2 Application of Stereo Image Modeling Technology

Computer 3D modeling technology is computer CAD technology. In the 1960s, Massachusetts Institute of technology proposed planar two-dimensional design technology. With the development and popularization of CAD technology, its function is becoming more and more powerful. With the continuous development of the current product design industry, the market has higher requirements for the refinement of product design, design quality and other aspects, and the complexity of product design scheme is also increasing. In this case, the traditional way of design through two-dimensional drawings has been difficult to meet the actual needs of design, manufacturing and production. In the process of 3D modeling of existing product design, it is difficult to meet the design requirements through one - time design. Therefore, the construction and design of product 3D models often need to go through three stages: design, simulation and redesign, so as to further improve the reliability of design. The process of applying CAD technology in 3D modeling mainly includes two links: CAD modeling and CAE simulation. The main technical process is to model and design the parts in combination with the design requirements and actual situation, and then use the corresponding software for virtual assembly, so as to ensure the scientificity, rationality and practicability of product design. On this basis, it is derived and gradually tends to be specialized, such as 3DMAX, Rhino and other software.

3 Current Situation and Development Trend of Coffee Machine Industry

Since entering the 21st century, cultural exchanges between the East and the West have become more frequent, accompanied by a variety of Western-style electrical appliances into Chinese life. Coffee machine is also one of them. With the popularity of coffee culture, the domestic market demand continues to grow. The main audience groups, the post-80s and post-90s, have become the main consumers, which makes the groups drinking coffee gradually grow, but at the same time, they also have high requirements for the quality and quality of coffee. The development of domestic coffee machine brand is relatively late, and the research theory of coffee machine is still in its infancy. Most coffee machine manufacturers stay in the cost performance of coffee machines to seek a breakthrough. At this stage, domestic coffee machine manufacturers are mainly divided into two categories: one is OEM export, and the other is independent brand. Domestic coffee machine manufacturers have low independent innovation components in their main businesses, and the proportion of scientific research investment in coffee machines is extremely uneven, which is also the main reason for the weak competitiveness of domestic coffee machine brand enterprises [3]. But generally speaking, the market demand for coffee machines is very huge and has a good development prospect. At present, coffee machines in the domestic market are mainly divided into American (traditional drip filter) coffee machines, Italian (high-pressure pump) coffee machines and capsule coffee machines.

4 Analysis of Relevant Elements of Coffee Machine Modeling Design

4.1 Appearance Modeling Factors

Appearance design is one of the important ways for users to obtain satisfaction in the process of using the coffee machine. Beautiful design can effectively improve the artistry and aesthetics of the coffee machine and enhance the added value of the coffee machine. The design of modeling can be divided into the following key steps: first, understand the design task and clarify the design goal; Secondly, through research and analysis, mining the demand image of positioning users; [2]. Then, according to the target product, analyze the relevant product modeling elements; Finally, the user demand image is associated with the product design elements, and then the relevant methods are used to carry out the innovative design of product modeling. The core of modeling element analysis is the deconstruction of product modeling features, which is the reverse thinking process of the original design, so that the artistic quality of coffee machine modeling can be improved, including integrating the emotional design concept, improving the interest and ease of use of design, improving the "attraction" of coffee machine and mining more "selling points". The common shapes of coffee machines are square, round and free form. These modeling languages also have symbolic meaning and symbolic meaning, so that consumers have a certain sense of identity. Therefore, whether from the perspective of product aesthetics or market, the research on the model design of coffee machine is of great value.

4.2 Material Factors

Broadly speaking, material refers to all materials outside people's ideology. Specifically, it refers to materials that can make useful equipment for human beings [6]. The texture of materials is particularly important for the model design of coffee machine. Different texture of materials will bring different visual enjoyment and use enjoyment to users, so as to improve the quality of products or meet some new use needs. However, due to the characteristics of the material itself, the shape of the coffee machine will be limited to a great extent, and different processing methods and molding processes also have a direct impact on the shape of the product. In the design process of coffee machine, the most common materials are metal, plastic, glass, wood and so on. In the design of coffee machine, the selection of materials is not a single use, but the superposition of different materials. Various materials perform their duties according to their characteristics, so as to give full play to their maximum characteristics, but they are interrelated and compared with each other, so that the texture, color and material characteristics of the materials complements each other, so as to enrich the tactile and visual charm of the coffee machine and improve the satisfaction of users. The selection of material is not only the material basis of the coffee machine, but also the bearing way of its artistic expression and communication. It must be matched with the function, overall form and processing technology [8].

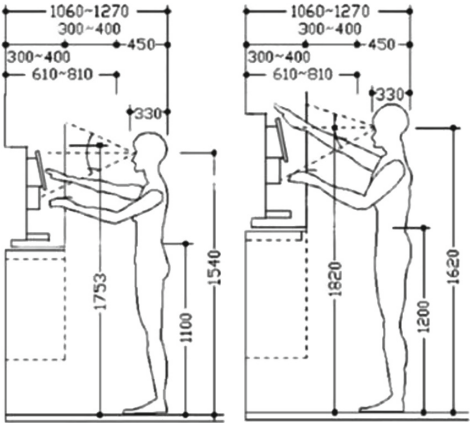

Fig. 1. Ergonomic human body standing size (female left, male right).

4.3 Relevant Man-Machine Dimension Factors

The principle of ergonomics is the concrete embodiment of the people-oriented design concept in product design. That is, in product design, the research method of integrating anthropometric data, mechanics, product use psychology and other fields [5] . Based on the characteristics of human structure and function, it studies the influencing factors and efficiency of people's psychological changes in the use of products by measuring the laws of people's output, habits, experience, physiological changes and so on [1]. The ergonomics of the coffee machine should be designed from two aspects: the size of the coffee machine and the button.

During the operation of the operator, the transverse width will affect the use efficiency of the operator. When people are standing, the width of women is about 66cm and that of men is about 70 cm. However, from the perspective of psychological needs, the required width needs to be increased by a certain size. According to the principle that the two arms in front of the body are at an angle of 50 degrees, it is easier to work, so the widest part of the coffee machine should be $\leq$ 760 mm. At present, the transverse dimensions of most coffee machines are within this range, and the situation with milk boxes will be close to this value. As shown in Fig. 1.

Push button switch is a component with simple structure and wide application. In the electric automatic control circuit, it is used to send control signals manually to control contactors, relays, electromagnetic starters, etc.

The knob is a controller for one hand operation. According to the functional requirements, the knob can rotate for multiple turns, or rotate and position less than 360 degrees. The knob is flexible, convenient and reliable, so it is widely used. In most products, the functions of the knob are mainly on-off and frequency modulation, and the shape is usually circular or polygonal, which is located on the top of the fuselage, which is convenient for one hand operation. The degree or quantity required to realize the function through forward or reverse rotation. As the most commonly used part of the product, the easily -to-use and beautiful knob will bring better use experience and improve work

Table 1. Size of ergonomic buttons.

Manipulation mode	Basic size of button		Stroke C	Press frequency times/min
	Knob diameter	square button length × width		
Press the button with your index finger	3– 5 10	10 × 5 12 × 7	<2 2–3	<2 <10
Press the button with your thumb	12 15	18 × 8 20 × 12	3–5 4–6	<10 <10
Press the button with the palm of your hand	30 50		3–8 5–10	<5 <3
Press the key with your finger	10 15 18 18–20		3–5 4–6 4–6 5–10	<10 <10 <1 <1

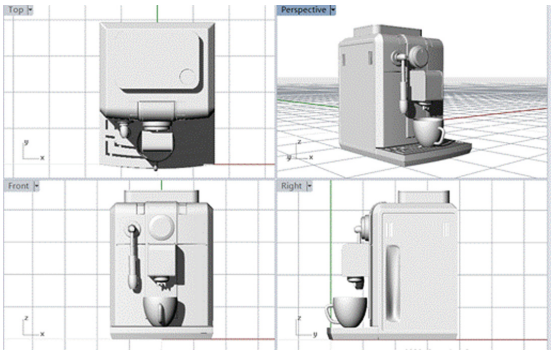

Fig. 2. Stereo image modeling of automatic coffee machine.

efficiency. For different operation modes, there are different requirements for the size of the button, resulting in different stroke and pressing frequency [4]. As shown in Table 1.

5 Practice of Coffee Machine Modeling Design

According to the analysis of relevant elements of coffee machine modeling design, design practice is carried out, as shown in Fig. 2.

According to the analysis of relevant elements of coffee machine modeling design, the coffee machine modeling is designed. Firstly, the long straight line modeling is adopted in the overall modeling, which is divided into parts to simplify the excessive modeling elements of the coffee machine and form a simple style. The top of the coffee machine is provided with a water tank and a coffee bean feeding port. The feeding port adopts a rectangular cuboid shape and is designed to stretch upward to ensure that the coffee beans can be stably placed in the coffee machine and form an overall simple

style with the machine body. The bottom of the coffee machine is designed to stretch outwards, which is used for the placement of coffee cups and the ponding table. The long arc element is used at the ponding table. The use of arc shape avoids the overall rigidity and rigidity, which is richer in shape and prevents excess coffee from leaving stains on the desktop. The overall dimension of the coffee machine is 280 mm long × Width 220 mm × 300 mm high design, common table height is 710 mm to 750 mm, in line with man-machine size factors. In terms of details, the adjustable steam knob, operating system button, high-pressure steam injection system, brewing head and other devices are designed to facilitate users to operate conveniently and quickly when making coffee and have a better operation experience. The adjustable steam knob is designed with a diameter of 50 mm, which is in line with the man-machine size factor, which is convenient for users to control the steam in use, so as to meet the needs of making different flavors of coffee. The operating system buttons are divided into switch button, coffee/steam button, water pump control button and cleaning button, which are distributed on both sides of the steam knob, and the size is 20 mm high × The 12 mm wide design is small but not bulky, making the whole fuselage more layered. The high-pressure steam injection system adopts retractable design to meet the needs of different sizes of coffee cups.

6 Conclusion

Through the application of stereo image modeling technology to the appearance modeling design of coffee machine, the design scheme in the modeling design stage of coffee machine is more intuitive and the product structure is clearer. Provide more inspiration for designers in the design process, optimize the design details, shorten the design cycle and improve the design efficiency. Through the research on the development trend of coffee machine, combined with the relevant elements of coffee machine modeling design, and on this basis, from the perspective of appearance modeling factors, material factors and relevant man-machine size factors, an automatic coffee machine modeling is designed by using computer modeling software. The application of image modeling technology improves the design efficiency of the appearance design of small electrical products, and provides a digital model scheme for the next production of coffee machine, which greatly improves the design efficiency of coffee machine and is convenient for batch production. Provide relevant references for the modeling and innovative design of small household appliances.

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