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Research on the application of reverse thinking in industrial design

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Abstract: Reverse thinking is a dialectical way of thinking, breaking through the inertia of positive thinking and allowing thinking to develop in the direction of opposites. The profession of industrial design requires designers to have a strong sense of fashion, grasp the current design direction, and understand the aesthetic style of consumers, so they also need to have a keen insight and foresight and active design thinking. In this paper, we explore the application of reverse thinking in industrial design and its significance in industrial design by exploring the concept of reverse thinking, characterization, classification and case study.

1. Introduction

Industrial design is a creative activity in the discipline of solving human-product interactions, providing solutions that meet human physical and psychological needs. [1] Design thinking is an important prerequisite for design expression, the beginning of a design solution is design thinking, and the end is design expression, therefore, design thinking is the first and important. From the consumer's point of view, different lifestyles and consumption levels cause people to choose and demand different products. From the designer's point of view, he must guide the consumer's view of consumption based on a full understanding of the product he is designing, so that he can design a design that is not only appreciated and cared for by the consumer, but also one that stands at the forefront of design. The reverse thinking design approach can inspire designers to be more innovative by stimulating their inspiration. Reverse thinking has a special and indispensable function in industrial design, especially when designing products that require great innovation.

2. Reverse thinking design method

2.1 The concept of reverse thinking

Reverse thinking, also known as divergent thinking, is to achieve a certain innovation or solve a problem with conventional thinking is difficult to solve, and the use of reverse thinking to find ways to solve the problem. Reverse thinking is to reverse the object of thinking, so that thinking to the direction of the opposite side of the problem, from the opposite side of the deep exploration, thinking reversal itself is a source of inspiration, traditional ideas and thinking habits often hinder the development of creative thinking activities, reverse thinking is to break through the inherent rules and

regulations, looking for a new path of innovation. At the same time, reverse thinking is a kind of rebellious thinking, with a new and different nature, can help designers break through the original thinking stereotypes, conceive a lot of conventional thinking by the unexpected things. [2]

2.2 Analysis of the characteristics of reverse thinking

(1) Universality. Reverse thinking has applicability in all fields. Because the law of the unity of opposites is universally applicable, and the forms of unity of opposites are diverse, there is a form of unity of opposites, and correspondingly, there is a reverse thinking angle. Sexual thinking is a dialectical existence of thinking, with upper and lower, high and low. Everything in the world has two sides, so everything can be considered using reverse thinking. We can see the application of reverse thinking in various fields, it has strong applicability and a variety of applications. Because in a variety of application methods, the aspect of turning from one aspect to the opposite is all reverse thinking.

(2) Critical. From the critical name, we can see that in contrast to positive thinking, positive thinking refers to conventional, common-sense, and recognized ideas and practices. Reverse thinking is just the opposite. It challenges traditional thinking, violates conventions, and abandons common sense ideas and practices. Critically, it can successfully overcome stereotypes, completely open up our design thinking, and open up a new journey.

(3) Novelty. Although simple thinking and traditional way of solving problems are simple, they tend to make their thinking rigid and rigid, and cannot get rid of the shackles of habit, and they often get answers that are commonplace. In fact, everything has many attributes. Because of the influence of past experience, people tend to see the familiar side while turning a blind eye to the other side. Reverse thinking can overcome this obstacle, often unexpected, giving people a refreshing feeling. The design cannot be unchanged. The reverse thinking design method is often a good breakthrough. It breaks through the traditional product style, gets rid of the conventional shackles, stimulates the designer's design inspiration, and also gives consumers a sense of freshness without causing visual fatigue.

2.3 Classification of reverse thinking and case studies

2.3.1 Anti-transition reverse thinking method

The reverse thinking method is to think in the opposite direction of the known things, [3] to find ways to invent ideas. The "opposite direction of things" is often the reverse thinking from the three aspects of the function, structure and causality of things.

The rocket first appeared in the form of "upward launch". Later, Soviet engineer Mi Haiyi used this method to design and research "downward launch" drilling rockets, ice-piercing rockets, rock-piercing rockets, etc., collectively referred to as as the "ground-piercing rocket." The scientific and technological community regards the invention of the "earth-piercing rocket" as a "ground-piercing method" that caused a battle.

The method of reverse thinking for the internal structure and function of things from the opposite direction, for the reconstruction of the structure and function of things has a prominent role. When using this method of thinking, the first thing is to find the "positive" and "negative" two opposing thinking points, and then look for a breakthrough point.

2.3.2 Transformational reverse thinking method

Conversion type of reverse thinking method refers to the study of the problem, due to the means to solve a problem is blocked, and converted to another means to switch the thinking angle, in order

to make the problem smoothly solved thinking method. Car tires are easily punctured, one way to solve this problem is to repair the road, another way of thinking can be used to convert the reverse thinking method, design a tire that does not hurt, and explosion-proof tires were born.

Many people encounter problems will be trapped by it, can not find a solution to the problem, in fact, if you can look at the problem from a different perspective, then a seemingly very difficult problem can sometimes be easily solved with clever methods. This requires us to develop this ability to look at problems from multiple perspectives in design.

2.3.3 Disadvantages of the reverse thinking method

Flaws reverse thinking is a way to use the shortcomings of things, the shortcomings into something that can be used, passive as the main to, turn the disadvantage into a favorable way of thinking.

The United States of America "three rice bucket singing team" is the use of shortcomings of the reverse thinking method, "hype" their own shortcomings, and thus become famous. The "rice bucket singing team" is the predecessor of the "three-man disco singing team", composed of three surprisingly obese boys, singing the subject matter is mostly about food, eating and drinking and fat and other jokes, very popular with the public. Once in Europe, the manager of a hotel saw that they were all fat and chubby, wearing wide and big uniforms, like three big barrels, so he laughed at them and suggested that they create a "rice barrel song" to sing, saying that it would complement each other. The manager was taunting and ridiculing, and the three fat guys were really annoyed and angry, but after the annoyance, they were happy. Yes, obese on obese, simply "three disco singing team" to "three rice bucket singing team", and improvised the "rice bucket song". The first day of singing won the audience thunderous applause. The record "Three Big Rice Buckets" recorded by the trio was released for the first time in 100,000 copies and was sold out in a few days.

From this story can be seen, shortcomings certainly have their inadequate side, but the discovery of shortcomings, understanding shortcomings, analysis of shortcomings and actively seeking ways to overcome or use it, can often create an opportunity to find a starting point. As the saying goes, there is a downside to a downside, and this unifying property of the relationship between pros and cons is the theoretical and practical basis for the continuous creation of new things.

3. The application of reverse thinking in industrial design

3.1 Functional Inverse Thinking

Functional reverse thinking refers to the thinking method of thinking in the opposite direction of the original function of things to seek new ways to solve problems. According to the existing function of things, to imagine the function of the opposite of it, and then design a new product design thinking method according to the opposing function. It means to think in the opposite direction according to the existing functions of things or products. For example, wind fire extinguisher. Now see the firefighters use fire extinguishers when fighting fires, there are wind extinguishers. The wind blows over, the temperature drops, the air is thinner, and the fire is blown out. In general, the wind is to help the fire, especially when the fire is relatively large. But under certain circumstances, the wind can make a small fire extinguished, and quite effective. [4]

3.2 Structural Inverse Thinking

Structural reverse thinking refers to the opposite structural form of existing things to think about the solution to the problem, so as to seek a new way of thinking about the problem, generally from the structural position of things, types, materials and other aspects of reverse thinking. For example, the smokeless fish frying pan sold in the market is to transfer the heat source of the original fish frying

pan from the bottom of the pan to the top of the pan.

3.3 Modeling Reverse Thinking

The reverse thinking is a way of thinking that rejects the shape of similar things and applies it reasonably to products that are of different categories and seemingly unreasonable shapes. The metal magnetic wall lamp designed by Ronda is shaped like a table lamp, both in terms of raw materials and appearance design and use, showing a new creative decorative concept. It can change the length and shape of the cable at will. Give consumers a brighter and more attractive.

3.4 Color Reverse Thinking

Color is the most sensitive formal element that can cause our common aesthetic pleasure. Color is one of the most expressive elements, because the nature of color directly affects people's feelings. Different colors give different psychological feelings, they have their own specific properties, and color matching is also an important part of the overall design aesthetics. In the design process color matching also has a corresponding grouping categories, different products suitable for different color palette. For example, warm tones give a sense of affinity, and white, blue, and black are often used in the color scheme of technology-based product design. Color reverse thinking is a hit in the design process of Apple's cell phone 11. The phone has made a bold innovation in color, abandoning the cold gray shell and using six color schemes, purple, white, green, yellow, orange, black and red. The texture is advanced, playful, cute and full of energy. In the process of product design, the reasonable and correct use of reverse design thinking can make the color design more creative and individual, impacting people's conventional habits and creating a distinctive effect. [5]

4. The significance of reverse thinking in industrial design

Reverse thinking means fundamentally reconfiguring things and people's cognitive habits, critiquing and improving existing design products to achieve a qualitative breakthrough. Problems that seem difficult to solve in the design process can be easily solved by thinking backwards. In the design process, reverse thinking can bring new ideas and designs that others may not have thought of or noticed, and can lead to unexpected successes. Reverse thinking also helps designers choose the best ideas and design approaches from a wide range of design options. By regularly using reverse thinking in the design process, complex problems can be easily simplified, thus shortening the design cycle and making a qualitative leap in design results.

5. Summary

With the continuous development of social and economic development and the progress of social and spiritual civilization, the design of products needs to be constantly optimized and innovated in order to keep up with the development of the times and meet the needs of the times. Designers cannot design products without a certain amount of design thinking, and reverse thinking is a part of it that is often used and effective at present. It not only helps designers to rethink objectively in terms of design thinking, triggering a new level of thinking and in-depth improvement of existing products, but also helps designers to think outside their own design circle and make their design thinking more extensive. Rational use of reverse thinking can enhance people's visual experience, enhance the creativity of design works, create a refreshing visual effect, and give the design a new style connotation.

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