Research on the Application of Green Design Concept in Industrial Product Design

Zhang Yan

Xi'an International University, Xi'an, Shaanxi, China

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Abstract: China is still in a period of rapid development, in this period, industry, as an important field of China's overall economic, has provided important support for the sustained economic growth of China. But on the whole, industrial development accelerates energy consumption and has a certain impact on the environment. The concept of ecological protection in the new period has been deeply rooted in people's hearts. It is an important measure to promote the further development of industrial economy based on environmental protection and resource saving by integrating green design concept into industrial product design and emphasizing environmental protection and energy saving. Based on this, this paper discusses the application of green design concept in industrial products.

1. Introduction

Industry is important fields in the economic development of any country. In the development of human history, industrial design and development have created great convenience for human beings' eating, clothing, sheltering and traveling, but they have also accelerated the consumption of resources and energy, at the some time, they have seriously impacted on the environment and damaged the ecological balance of the earth as a whole [1]. Nowadays, the industrial development of every country in the world has entered the heyday; at the some time, people have also realized the importance of environmental protection while improving the quality of life. Therefore, people began to look for ways to promote the progress of the industrial revolution and protect the environment and resources meanwhile. Under this background, the concept of green design was put forward and widely used [2]. Nowadays, the concept of green design is widely used in the fields of industry, construction, transportation and so on, which provides an important method for the sustainable development of economy.

2. Outline of green design idea

Green design is the most popular design idea in various fields of design in the present times, and it is also the mains trend of design development in the future. Green design is usually called ecological design, environmental consciousness design, etc., which highlights the concept of environmental protection in the design, and which is based on ecological environment protection. Nowadays, as the rapid development of industrial economy in China, environmental pollution has become a big problem while the industrial product is becoming more and more diversified. In the industrial product design, it is particularly important to consider the attributes of environmental protection of the products [3]. In the design of industrial product, we should set up the consciousness of environmental protection, construct the concept of green design, re-examine modern design; moreover, we should take resources saving and environment protection as the purpose of design, start from the perspective of harmonious coexistence of environment and industrial development, and make full use of resources, so as to achieve the green design goal of industrial product. In general, green design should start from two aspects: design requirements and designers. In the design process, we should not only follow the principle of green design, but also enhance the green value of product on the basis of ensuring the performance and function of products. At the same time, the designer is required to apply the green design concept to all the designs of industrial

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products, to ensure applying the concept in the process of product design, and applying the concept in all the segments of industrial design.

3. The design principle of green design idea in industrial product

It is important to pay attention to the principle of rational allocation of resources in the application of green design concept to the industrial product design. In the actual design, some designers have not had a correct understanding of the concept of green design, they think that the concept of green design should protect the pure green of the product, and finally the product must show the green value [4]. However, in the actual design activities, the principle of rational allocation of resources should be highlighted. Green design emphasizes environmental protection and effective utilization of resources, so in the design, the designers should not only pay attention to the cost of product design and production, but also consider the rational allocation of the material resources, such as material resources, human resources and financial resources. For designers, green design not means only applying those green and environmentally friendly materials, by this way, it will not only increase the cost but also fail to guarantee the performance of the product; to the contrary, it means on the basis of ensuring the performance of the product, and then, improving the green performance of product, reducing costs, improving the utilization of resources, so as to use the green materials and conventional materials reasonably and achieve the reasonable allocation of resources.

In today's world, the speed of development of science and technology is very fast. The birth of new technology and new materials has also promoted the rapid development of industrial industry. The designers should pay attention to the new techniques and the new technology, and to carry out the product design according to the technical principles. Nowadays, the green idea is deeply rooted in people’s heart, in the actual development, green materials can be seen everywhere in the market, the techniques and technologies of producing green materials are also being updated, as well as the techniques and technologies of producing industrial products. The requirements of people for industrial products are stricter, as well as the green design of industrial products. So designers must pay attention to new market trends, new materials, new techniques, and new technologies. In the design process, they should fully consider whether the design concepts are in accord with the modern new techniques and technologies of the present times, so as to design a higher-quality green industrial product.

4. Application of green design concept in industrial product design

In the industrial product design, the rational use of green materials is a very important design segment. Green material has the characteristics of environmental protection and pollution-free. It can effectively reduce the harm to the environment and the workers when it is used in the design of industrial products [5]. In the past, in order to improve the performance of industrial products, some products included materials that could improve their performance but were harmful to the environment and workers’ health. Although there are some corresponding protective measures that are designed based on safety considerations, but these protections become disabled in high temperature and humid environment for a long time, and the harmful substances volatilize, which is harmful to workers’ health or environment. In the new times, industrial product design emphasizes green and environmental protection. Therefore, in the process of designing product, on the basis of satisfying the basic performances and functions of industrial products, materials with strong environmental compatibility are selected, which are preferably renewable and recyclable; and the industrial products can not only meet the actual requirements in performances and functions, but also have a small impact on the environment, effectively reduce energy consumption and achieve the purpose of saving resources. There are three principles in the selection of green materials for industrial product design. One is the priority of renewable materials, the use of recyclable green materials as more as possible, so as to effectively promote the resource utilization and the realization of sustainable development of industrial production. The second is to give priority to low

energy consumption, less pollution, non-toxic, harmless, non-radiation materials to protect the ecological environment and people's health. Finally, it is to give priority to use those materials with good environmental protection features, which can be easily resolved in the natural environment even if the product is finally discarded.

The performance of the product and the function it can play in the end are directly related to the design. The products of the same type and different specifications may play the same role; but the performance of each part and each component of the product may be very different. In the design of industrial products and the design of the products' performance, the designers should paid attention to the detachability of the design products. If an industrial product is a holistic design, its important parts and components cannot be disassembled. When a certain part is damaged, it basically means that the whole product has lost its function, but if the detachability of the industrial product is strong, it can be repaired after replacing a certain part or component damaged, which not only reduces the transfer quantity of the industrial product, at the same time, it reduces the cost of disassembly and prolongs the service life of the product. Disassembly design is an important part of green design. On the basis of satisfying the basic performance and function of the product, the design principle of disassembly performance means four points: one is to minimize the work load of disassembly in the design. In other words, the design of industrial product should not be too piecemeal, but should be clear about the position of the product, which have been disassembled; in addition, to design the assembly details that are convenient for disassembly, and for the integration of the products' functions; Secondly, the product structure should be predicted based on the function of the product, and the detachable part should be easily detached so as to avoid bad influence on other parts. Third, the proper fastening method should be chosen to ensure that the stability of the disassembly point will not change after disassembly and recombination. Fourth, the design of product should be easy to separate, avoid the use of a large number of tools.

The recycling performance of industrial products is an important design content of resource saving in green design. In industrial product design, the integration of green design concept should not only consider the compatibility between product materials and environment protection, but also pay attention to the recyclable utilization of products, and select the materials that can be recycled in the design as more as possible, so as to improve the products' recyclable features and play its recycling value. By this way, we can effectively save resources. In the actual design of the product, the designer must consider the recycling value, recycling method, recyclable structure and recycling process of the whole product or a part of the product, so as to maximize the recycling performance of the product. Nowadays, in the industrial product design, the reusable parts and materials have been paid attention by almost all designers, so the recycling performance of the product in green design has also become an effective design segment for the recycling of resources. It should be noted that the recyclable part of the product should be marked with a special label of recyclable material in the design.

In industrial product design, green packaging design is also an important part of green design. Green packaging can not only achieve good results from the visual point of view, but also the packaging design can be carried out from the perspective of environmental protection, which can provide important support for environmental protection [6]. In the design of industrial products, we should start from the concept of green environmental protection, optimize the plan of product packaging, reduce the pollution caused by product packaging to the environment as much as possible; at the same time, we should save the packaging materials as much as possible and avoid the waste of resources. Green packaging design mainly follows the following principles: first, to save packaging materials as less as possible, to reduce the amount of packaging materials on the basis of packing and protecting products; Secondly, packaging materials can be recycled by certain means are applied. If they can not be used, they can be degraded in the natural environment and will not pollute the environment.

5. Cost analysis of industrial product based on green design

The cost of industrial products, which based on green design, may be increased. But compared

with the products designed according to traditional design concept, the product value of the products with green design is also increased. Industrial products based on green design take full account of the resource utilization, the detachability and the recycling of the product at the early stage of product design, so, in the process of production, if the designers choose the green materials, the cost may be more expensive, but the performance and function of the final product are full. To the contrary, due to the green performance of the product, its important value can also be brought into play in the later application, such as the life span of the product prolongs, it is easy to reuse, and it is friendly to the environment, etc. At last, by overall consideration, the overall cost of green industrial product is low, and this kind of product can maximize the value of the product.

6. Conclusion

The integration of the concept of green design in industrial product has promoted another efficiency industrial revolution and it has become the mainstream direction of industrial design in the new era. In the future, the concept of green design will be a priority design concept for a long time, which is not only a necessary measure to protect the environment and save resources, but also a practical demand for the development of modernization of industrial design. Green design emphasizes the effective use of resources, while the resources of the earth are becoming increasingly rarer and rarer, if every product is integrated into the concept of green design, it will save a large amount of resources; and at the same time, for the efficient use of recyclable resources, the cost of industrial product will be effectively reduced, and the profits of the enterprise will be increased. The concept of green design is in accord with the requirements of ecological and industrial development in the new era. In the future, it is necessary to further optimize the design and create a green production environment.

References

[1] Tian Zhihua, Liu Xiongwei, Liu Junyue. Compilation Ideas and Technical Points of *"Green Design Standards for Industrial Buildings in Shenzhen"*[J]. Building Energy Efficiency, 2017(1):125-128.

[2] Han Yu. The First Batch of Group Standards for the Evaluation of Green Design Products issued by National Industrial Green Product Promotion Alliance and the China Industry-University-Research Institute Collaboration Association [J]. Science & Technology Industry of China, 2016(9):32-33.

[3] Niu Yu. Application and Analysis of Green Design Concept in Industrial Design [J]. Science &Technology Economy Market, 2016(12).

[4] Zhao Yan. Establishing Evaluation Criteria and Leading Green consumption----China National Institute of Standardization Issues the First batch of Green Design Products [J].China Standardization, 2016(4):56-57.

[5] Li Feng, Yang Yang. "Low Technology" Green Design----Researching Centre of Chengdu Construction Green Industrial Park [J]. Eco-city and Green Building, 2017(1):40-47.

[6] Niu Fang. From Stock to Increment, Practicing Green Development----Narrating the “Forum on Green Design and Green Manufacturing Engineering for New Fiber Materials” [J]. China Textile, 2016(7):65-65.