

Exploring The Use Of Green Design In Modern Design

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Abstract. In the long history of design, with the development of industrial revolution. The socialized production required designers to reflect on modern technology culture and ecological destruction. From then on, the green genre had appeared, and the green design trend had lead the design method. Nowadays, the increasingly serious environmental problems force us to reflect on our design life, apply the green design method to design, explore the future green design development trend from resources and methods, and implement the green design throughout the design to achieve the green value of design.

1. Introduction

The rapid development of science and technology have constantly changed people's lives and promoted the rapid development of society. Designers emphasized people-oriented design while neglecting environmental problems. Industrialized production destroyed the natural environment and accelerates the speed of resource depletion. Global environmental problems have become more and more severe. The designer realizes that there is a crisis between man and nature; rethinking the relationship between environment and products in the form of redesign, reducing the negative impact on the environment, and encouraging people to pay attention to and coordinate Natural environmental protection. People began to understand and realize the importance of nature and re-examine the relationship between man and nature, so green design is bound to become a global focus.

2. The origin of green design and the concept

Green design was one of the design trends that began in late 1980s. ^[1] Green Design (GD) Green design emphasizes that production and consumption have little impact on the environment. Green design is neither a simple design style change, nor is it a general work. The adjustment of the method, strictly speaking, is a major change in design strategy, a reflection on human behavior from today and the future, and a topic of global discussion on many political and economic issues in the world. In general, green products are green materials that use green materials to protect the environment, green design, green manufacturing, green packaging, and environmentally friendly products that are recyclable, energy-saving, and zero-pollution.

Green design is different from traditional design. Green design needs to adhere to the "4R" principle: Reduce, Reuse, Recycle, and Replace. Green products start from the concept of formation to the final abandonment of reset, the entire life cycle is reducing resource waste, recycling effective resources. When designers redesign products and meet the requirements of green products, they must firmly believe that design can promote social development and improve the environment to achieve the goal of "human-product-environment" coordination.

3. The situation and thinking of green design

The importance of the relationship between human and nature in order to achieve sustainable use of natural resources, green manufacturing, green economy, and continuous improvement of quality of life. ^[3] As more and more countries, enterprises and individuals around the world begin to promote sustainable development. More and more products begin to focus on Green Design. From the 2017

Environmental Responsibility Report released on the APPLE official website in 2017, from 2011 to 2016. The average annual greenhouse gas emissions of the products decreased from 137.2 kg to 97 kg, as shown in figure 1.



Fig 1. Average carbon emissions per product

APPLE has been pursuing a carbon footprint between hundreds of suppliers, millions of users and hundreds of millions of devices, from design, production to distribution, recycling, and the entire life cycle of products from a green design perspective to build a green system. 96% of the resources already use renewable resources, including wind, water, biogas fuel, geothermal and solar energy. In the production process, APPLE uses the clean renewable resources instead of the traditional way to form the required energy, which has been significantly reduced compared to the previously generated greenhouse gas emissions.

As is clearly shown in the figure 2 that the iPhone X, which was released in 2017, produces a 64G memory phone that produces greenhouse gas equivalent to 79 kilograms of carbon dioxide, as shown in figure 2, which is roughly equivalent to the emissions generated by driving a Toyota Hybrid 500 km from the report, as shown in Figure 3. About 80% of the emissions from iPhone X come from production, while 17% come from users. Therefore, it can be seen that the use of the mobile phone itself does not affect the environment, but most of it comes from production.

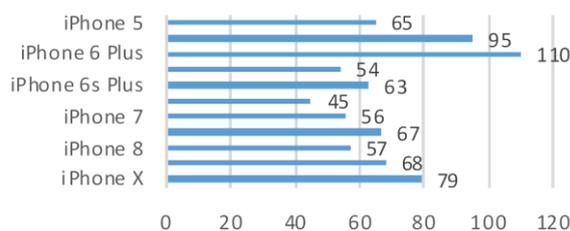


Fig.2. Carbon emissions from iPhone products in recent years

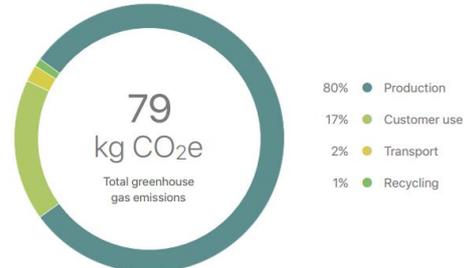


Fig.3 64G iPhone X life cycle carbon emissions ratio

Additionally, APPLE has taken a series of measures to prove its philosophy of adopting green design. First of all, on the packaging, 55% of the retail packaging is recyclable. At the same time, Apple has adopted the policy of replacing the old mobile phone with the old mobile phone, recycling the old mobile phone, some of the components can be recycled and reused. Reuse has greatly reduced the pressure on resources. In our lives, we have to reflect on the relationship between green design and product marketing, how to achieve balance, and how to apply green design to our lives as much as possible.

4. The method and content of green design

4.1 Green design method

4.1.1 Life cycle design method

Product life cycle design is to comprehensively considering the product life cycle process in the design stage of the product [4], that is, from material selection, collection to processing, product manufacturing, packaging and distribution, use, recycling, and scrapping process, green design is the main The guiding ideology, proceed to optimize each process. Pay attention to understanding the material, structure and cost in the environment, function and aesthetics. When considering the life

cycle, it should be especially aware of the importance of product replacement and maintenance issues. The filter element in the household water purifier determines the quality of the water purification. Under the condition that the price of the water purifier itself is not high, the company maintains its profit by replacing the filter element product cost and labor cost. From a green design point of view, the installation of the product and the convenience of care directly affect the life cycle of the product. Therefore, extending the life cycle of a product is far more than a solid problem of the product itself, and the after-sales of the product is still a crucial factor.

4.1.2 Modular design method

Modular design to a certain extent, the product is divided into functional modules based on different functions or products with different functions and different specifications, and different products are formed through the selection and combination of modules to meet the different needs of users. The modular design method first satisfies the requirements of easy assembly, dis-assembly and maintenance of the product.

The designer applied the green design to Coca-Cola. After the discarded Coca-Cola bottle was installed with different functions, new life was given to the bottle. It changed from a waste garbage to a shower, a shower head, a seasoning bottle, Dumbbells, bubble bottles, rattles, etc. have a new meaning of use, see Figure 4. In the reuse of resources, in parallel with the modular design, the life cycle of the entire product is extended.



Fig.4.Coca-Cola modular redesign

4.1.3 parallel engineering method

Concurrent engineering is a model and system method for modern product development. It designs products and related processes in an integrated and parallel way, and strives to apply the concept of green design to product manufacturing from the very beginning of design. [4]The entire life cycle of scrap recycling is considered, and taking into account all the factors involved in the entire closed loop, so that the product is green optimized.when comparing Parallel Green Design to traditional design, we need to design a green design throughout the life cycle in every environment of design decision-making to complete the closed-loop process from concept to recycling.

4.2 Green design content

4.2.1 Material selection

The selection and management of materials is key factor in product design. Green design requires us to be friends with nature, and choose safe, non-toxic, recyclable or degradable when using materials. How to make rational use of resources and efficient application of recycled materials will become a new trend in future green design. Carolin Peitsch, a German designer, tried to make the abundant aquatic plants into fibers by physical means. With the help of biodegradable resin, the regular chair surface was made, and the simple wooden chair frame was matched to form a simple large-leaf seaweed chair.



Fig. 5. Big leaf seaweed chair by designer Carolin Peitsch

4.2.2 Functional design

Function is the unique attribute of the product, we still can't ignore the uniqueness of the function in green design. Products should not be redundant and unrelated functions are piled up together, should be simplified, abandon meaningless operations, improve function utilization, so that every function, every component has a meaning of existence. At the same time, it may also be a multifunctional conversion, selecting a reasonable function in the corresponding use environment. This can be confusing, whether it is more or less functional. Simply put, a product can have multiple functions, and when converted to one, try to have as few features as possible at the same time.

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4.2.4 Packaging design

The sustainability and economy of packaging materials, appropriate use of disposable packaging and pure decorative styles, to prevent excessive packaging, improve resource utilization, and minimize waste. IKEA's packaging design can be called art, Ikea's finished products are packaged in flat plates (as shown in FIG. 6), which make full use of transportation space in a regular shape and reduce costs to achieve the lowest product price. At the same time, ikea has also taken into account the internal materials in the packaging. Compared with the market, which USES degradable EPS to fill the gap in the packaging, ikea has developed a series of plant fibers and paper to replace EPS, with the same protective effect. Ikea will also fold the paper material to protect it from shocks. IKEA fully integrated the concept of green design into product packaging design, replacing the traditional packaging industry with more efficient and green packaging.



Fig. 6. IKEA flat pack

5. New highlights in global green design

Dutch artist Daan Roosegaarde uses a lightweight material to make a "vacuum tower" using nanotechnology to create a large magnetic field to absorb smog particles and filter to produce pure air. This tower does not consume electricity in the traditional way, but consumes all of it. Sustainable development of green new energy. Finally left in the vacuum tower is a granular dirty thing, which uses carbon as the main element, and the composition of the gemstone is also carbon. Daan treats the haze particles by high pressure for 30 minutes to make a ring. One of the rings The gems are equivalent to purifying 1000 cubic meters of clean air. A smog particle ring can't completely play a role in the environment, but Daan's concept is worthy of our respect, let us always pay attention to environmental issues, and carry out the green design to the end, as shown in figure 7.



Fig. 7. Haze particle ring

As shown in figure 8, Energy Seed, designed by *Sungwoo Park* and *Sunhee Kim*, consists of an LED halo and a battery recycling bin. It has openings for different types of batteries on the market, inserting waste batteries into the mouth in a specific way, we know that despite It is a waste battery that cannot drive household appliances, and there is still electricity that has not been exhausted. The energy superposition of multiple used batteries can provide power for the LED aura. Although Energy Seed is currently not a concept product, its concept still has merit. Hope to make every used battery a green seed, continue to shine, replace or partially replace the existing street light. Energy Seed's design changes not only in material improvement, but also in calling on everyone to join the ranks of green life, without wasting any bit of resources, and lighting up a green light in people's minds, as shown in figure 8.



Fig.8.Energy Seed

6. Conclusion

The proposal of green design is an inevitable choice for human beings to constantly improve themselves. At the same time, people's awareness of environmental protection is constantly improving. In the future life and production, green design will surely run through it, which is an irreversible trend of the times .^[5] There are still many we need to know, understand it, explore it, and apply it to the design to solve various problems.

6.1 Exploring from resources

Excessive demand for natural resources leads to imbalances in resources. We should minimize the use of scarce raw materials, avoid the use of toxic and hazardous materials, prioritize the use of renewable or recyclable materials, or use as much degradable or degradable materials as possible. . We should rationally use limited resources to explore the use of renewable resources, such as solar energy, wind energy, water energy, etc.,and turn them into favorable resources. More efficient use of clean resources in our products, industrial design is the need to apply its methods to our products, comprehensively consider the product life cycle, so that the product achieves the overall "green."

6.2 Exploring from the way

In today's search for sustainable green development, companies are no longer just making products, but in order to make products develop better and better, this must correspond to the design trend of green design. Designers should reasonably give the product a long life, focus on green design in all aspects of the product life cycle, from green production, low-cost transportation, detachable assembly, sustainable recycling, to life. The closed loop of the cycle. Simplify design packaging as much as possible in the packaging design of the product. Explore the product's complete life cycle and implement green design in different ways.

Green design is the only way in our development path, and it is also the inevitable choice for sustainable development. However, green design is not completely aimed at realizing the high utilization of resources, developing the function and aesthetics of sustainable and discarding products. It is not entirely for realization. Green output and high cost input in technology or energy. We should explore and apply green design with more reasonable and efficient means to realize the value of green design under the social needs and the public aesthetic.

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