

Research on Public Art Media in the Context of Sustainable Design - Taking PLA Materials as an Example

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Abstract:

Today, with the rapid development of science and technology, contemporary public art has risen rapidly in metropolises around the world, and people's demand for it is also growing day by day. But at the same time, a series of vicious ecological and environmental problems, such as water depletion, air pollution and climate anomalies, have emerged, and human beings are facing great challenges. This paper aims to explore the importance of sustainable design in today's design field, and take the application of PLA materials as an example to deeply explore the value and significance it brings. With the development of society and the progress of The Times, sustainable design is not only a form of design, but also a cultural and spiritual supplement, which is an effective means to achieve environmental resource protection, thus providing beneficial enlightenment for people.

Keywords:

Contemporary Art, Sustainable Design, Public Art, Materials, Media

1. Introduction

In today's rapid development, a series of vicious ecological environmental problems, such as water depletion, air pollution and climate anomaly, have emerged, and human beings are facing great challenges. In the design of public art, the adoption of media also needs to follow the concept of sustainable design. Use materials like PLA.

2. The Era Background of The Emergence of Sustainable Design

Sustainable design emerged in the 1980s, represented by designer Manzini, and was formed on the basis of sustainable development. With the growing awareness of sustainability around the world, designers are constantly exploring more contemporary creativity, technology, control, safety and other factors to achieve greener production. Therefore, sustainable design is not only a kind of creativity, but more importantly, it should be explored and implemented from multiple perspectives in order to achieve better results and achieve more long-term goals.

Sustainability was first proposed by Hans Carl von Carlowitz in 1713. [1] In 1987, according to the Brundtland Report, sustainability was defined as “economic development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.” [2] This definition has been used to this day, and under the promotion of the United Nations, the theory of sustainable development has gradually attracted the attention of the world. Researchers have expressed their views on sustainable development, adding the concepts of “optimal ecosystem”, “economic ecosystem”, “harmonious coexistence between man and nature” and “guarantee of natural resources” to be fully satisfied for sustainability. [3]

2.1. The concept of sustainability

The concept of sustainability includes not only the sustainability of the environment and resources, but also the sustainability of society and culture. The design concept suitable for sustainable development is based on the premise of harmonious coexistence between human and natural environment. Sustainable design requires the harmonious development of human and environment. Sustainable design starts from people, environment and works as anchors to form an ecological closed loop of sustainable environment, sustainable society, sustainable culture and sustainable resources. With the concept of sustainable development and the common destiny of mankind as the basic concept of design, to promote green sustainable development as their own responsibility, with green design to guide the practice of green lifestyle, design-related work as green action measures.

3. The Selection of Public Art Media Should Follow the Concept of Sustainable Design

Nowadays, with the rapid development, a series of vicious ecological and environmental problems such as water source depletion, air pollution and climate anomaly have emerged, and human beings are faced with great challenges. Therefore, in the design of public art, the adoption of media should also follow the concept of sustainable design, starting from localization, persistence, environmental friendliness, dematerialization, solving energy problems and reducing.

(A) Localization: using traditional processes, choosing natural materials or using local raw materials.

(B) Persistence: reflux, anti-temporary, open design, standardized parametric design, adapt to different periods and different audiences, easy repair and waste utilization.

(C) Environmentally friendly: avoid the production of toxic substances, biodegradable materials, natural materials, avoid or reduce greenhouse gases, release fertilizers, biological production, solve the water crisis, refuse one-time design, recycling.

(D) Dematerialization: promote health and safety, reduce visual pollution, share ideas, and replace with digital technology.

(E) To solve energy problems: clean energy, less noise pollution, the use of natural light, the use of biomass energy, manpower drive, improve energy efficiency, reduce energy consumption, recycling.

(F) Reduction: to structural components, lightweight structures, flat products, portable design, reduce raw material consumption, choose environmentally friendly

materials, reduce waste occupy space, cold manufacturing, easy assembly and disassembly, zero waste production, one thing multi-purpose.

Zhu Xiaocun, a teacher from the School of Design and Creativity of Tongji University, said in the open class “Future” (Sustainable Design Education: Helping the Double Carbon Goal) that every piece of clothing and every meal contains everything in the world, and contains sustainable challenges and opportunities. In this big picture, focus on the here and now, because sustainability is everywhere. Every design decision we make affects the entire planet by influencing human activity. So we need sustainable designers.

3.1. Designers should give priority to renewable materials

In the design, it is necessary to give priority to the selection of renewable materials, in the renewable materials to choose materials with low regeneration cost, durable consumable materials, materials with green additional significance and materials conducive to health and environmental protection. In line with the concept of symbiosis between human and nature, in line with the concept of ecological environment of the system, the sustainable development of resources, environment, society and culture is taken as an important value basis for design, and the recycling of materials is emphasized. Moreover, the management, maintenance and preservation of public art is particularly important for its later benign development [4]. Therefore, the choice of media should also take into account the subsequent management, maintenance and preservation.

The application of various new materials and new technologies is also constantly promoting the revolutionary development of contemporary public art. In particular, green bioplastics are popular with artists for their special physical properties as the material of choice for many interactive installations.

3.2. Designers should give priority to renewable materials

Traditional plastic is a synthetic resin obtained from raw materials such as oil and natural gas through processing and extraction, and is made into plastic raw materials by adding additives. The main component is synthetic resin, and appropriate synthetic materials are added according to needs to make plastics with different uses. Plastic through the continued processing of raw materials, through mold molding extrusion, blow molding and other processes, and finally form plastic products. Traditional plastic products have become one of the most popular materials since the 20th century because of their light weight, high strength, low cost, durability and easy production, but in spite of this, the production, use and disposal of plastics have caused very serious environmental pollution. On January 1, 2012, Haikou Province issued a “plastic ban”, which clearly stipulates that the plastic products in the “Haikou Province Restricted the manufacture and sale of general non-degradable plastic products (the first batch)” must be strictly observed and must not be used. To this end, Hainan Province has launched a series of new plastics, such as bioplastics, which are green, environmentally friendly, recyclable, low pollution and other characteristics, and are expected to be an effective replacement for conventional petroleum-based plastics. Bioplastic is a type of plastic made from plant starch, or gelatin or AGAR. Since it is not extracted from petroleum, they are more environmentally friendly. With a few simple ingredients and a stove, it's easy to make bioplastics at home. With the progress of science, the use of bioplastics has been greatly expanded, from hard, soft

to a variety of products, such as clothing, furniture, food, daily necessities, cosmetics, furniture, toys, home, building materials, furniture, lamps, etc., they can be used.

4. The Application of New Material PLA

Polylactic acid, also known as polylactide, is a new type of biodegradable material, which is a polyester polymer obtained by polymerization of lactic acid as the main raw material. It has good thermal stability, processing temperature 170 ~ 230°C, good solvent resistance, can be processed in a variety of ways, such as extrusion, spinning, biaxial stretching, injection blow molding. In addition to biodegradation, products made from polylactic acid have good biocompatibility, gloss, transparency, feel and heat resistance. It's a new type of biodegradable material, using renewable plant resources (such as corn) made of starch raw materials. Starch raw materials through saccharification to obtain glucose, and then from glucose and a certain strain fermentation to produce high purity lactic acid, and then through chemical synthesis method to synthesize a certain molecular weight of polylactic acid. It has good biodegradability, can be completely degraded by microorganisms in nature after use, and eventually generate carbon dioxide and water, which does not pollute the environment, which is very beneficial to the protection of the environment, and is recognized as an environmentally friendly material. The treatment method of ordinary plastics is still incineration and cremation, resulting in a large number of greenhouse gases into the air, while polylactic acid plastics are buried in the soil to degrade, the resulting carbon dioxide directly into the soil organic matter or absorbed by plants, will not be discharged into the air, will not cause the greenhouse effect. Good mechanical and physical properties. Polylactic acid is suitable for blow molding, thermoplastic and other processing methods, easy processing, widely used. It can be used to process all kinds of plastic products from industry to civil, packaged food, fast food lunch boxes, non-woven fabrics, industrial and civil fabrics. And then processed into agricultural fabrics, health care fabrics, rags, sanitary products, outdoor anti-ultraviolet fabrics, tent cloth, floor MATS, etc., the market prospects are very promising. Good compatibility and degradability. Polylactic acid is also widely used in the field of medicine, such as the production of disposable infusion equipment, non-disassembly type surgical sutures, etc., low molecular polylactic acid as a drug slow-release packaging agent.

In addition to the basic characteristics of biodegradable plastics, they also have their own unique characteristics. Conventional biodegradable plastics are not as strong, transparent and resistant to climate change as conventional plastics. The basic physical properties of petrochemical synthetic plastics are similar, that is, it can be widely used to manufacture a variety of applications. Polylactic acid also has a good gloss and transparency, and the use of polystyrene film is comparable to other biodegradable products can not provide. With the best tensile strength and elongation, polylactic acid can also be produced by a variety of common processing methods, such as: melt extrusion molding, injection molding, blow film molding, foam molding and vacuum molding, with similar forming conditions to widely used polymers, in addition, it also has the same printing properties as traditional films. In this way, polylactic acid can be made into a wide variety of application products in response to the needs of different industries. The film has good permeability, oxygen permeability and dioxide-carbon permeability, and it also has the characteristics of odor isolation. Viruses and molds easily attach to the surface of biodegradable plastics, so there are safety and health concerns, however, polylactic acid is the only biodegradable plastic

with excellent antibacterial and antibacterial properties. When polylactic acid (PLA) is incinerated, its combustion calorific value is the same as that of paper, and it is half that of traditional plastics (such as polyethylene), and the incineration of polylactic acid will never release toxic gases such as nitriding and sulfide. The human body also contains lactic acid in the form of monomers, which indicates the safety of this decomposable product.

In 2021, an installation called Aurora will be exhibited at the Design Museum in London (Figure 1, Figure 2). Through 3D technology, the bioplastic polylactic acid (PLA), a non-toxic thermoplastic extracted from plants, is 3D printed, assembled, recycled and repeatedly printed in a closed and continuous cycle (Figure 3). Finally, it was used as compost, which achieved its return. Working in the cloud through the 3DEXPERIENCE platform, the design team created a virtual space in which to complete the unique art form of the “twin” of the artwork by precisely replicating the atrium of the Design Museum in London. This remarkable design is the result of a joint effort between architect Arthur Mamou-Mani and Dassault Systemes. Aurora, an integral part of design for Life, is the latest result of the project. It integrates design, technology, engineering, and a comprehensive interactive device that can promote the common development of mankind. It is committed to promoting the progress of society, promoting the common development of mankind, and bringing more opportunities for the future of mankind.



Figure 1. Aurora overall.



Figure 2. Aurora Details.



Figure 3. From left to right: polylactic acid pellets, upright model, model surface.

This work is also a new achievement of public art design media and practice in the context of sustainable design.

5. Conclusion

Sustainable design plays an important role in modern design, and the value and significance it can bring include people's warm expectations for future social development. Especially in the trend of continuous development of society and continuous progress of The Times, it is not only a form of design, but also a supplement of culture and spirit, and an important way to realize environmental resource protection. Therefore, in considering the future development of the case, designers must consider from a long-term perspective, can not only focus on the immediate interests, guide Chinese design onto the road of sustainable development [5]. With the passage of time, the future resources and environment problems are more prominent, in order to achieve ecological life and development, the exploration of sustainable development mode is still urgent and necessary [6]. In the future, resource and environmental issues will become more prominent. In order to better protect our “blue planet” and realize ecological and sustainable development, it is very necessary to design media and practice of public art under the background of

sustainable design. In the future, public art design will continue to break through the previous model. Through a variety of new materials, new media to achieve the harmonious relationship between people, environment and works, so as to achieve sustainable development.

Conflicts of Interest

The author declare that there is no conflict of interest regarding the publication of this article.

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