

# Collaboration Brings Innovation

## The Teaching Research and Practice of Design on Recycling of Waste Materials

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**Abstract**—Based on the premise that China's manufacturing industry has produced large quantities of waste materials, which caused the environmental pollution, this paper focuses on the teaching research and practice of design to upgrade waste materials' recycling, under the collaboration among colleges and enterprises. Practice found that collaboration can strengthen exchanges between school and society and improve the professional level of theory and practice, so as to speed up the design efficiency and enhance the competition ability of enterprises. Hope the result of the teaching research can be valuable, and arouse academia and industry to have further attention and discussion on the sustainable development of waste resources' recycling.

**Keywords**—collaborative innovation; waste materials; upgrade the recycling; teaching practice

### I. INTRODUCTION

Though "China manufacturing" is well-known in the world, its mass production has brought a lot of waste materials, such as remaining and tailing materials and used parts, which have become one of the major sources of pollution to ecological environment. If these waste materials are dealt with in the traditional way of "landfill" or "burning", they will bring pressures to the ecological environment. If through the "melted down" processing to change them into raw materials, they possibly will increase the cost of logistics, the consumption of energy, and reduce the quality of raw materials. In the current situation of the industry and social background, after making great efforts, Department of Art and Design of Guangdong Industry Technical College founded the collaborative innovation team for "Waste Resources Updating & Reengineering Design Teaching". This team is composed of 12 teachers of the college and 6 experts from different fields of enterprises, and will be devoted to the design teaching research and practice on how to upgrade the recycling of waste materials' reconstructing. The teamwork will follow the model of "school-enterprise cooperation responsibility system + teaching and research director duty system + the backbone teacher leading role system".

### II. COLLABORATIVE TEACHING RESEARCH AND PRACTICE OF CREATIVE DESIGN

#### A. *The basic situation of the teaching*

"The teaching and research of design on the recycling of waste materials" team is composed of experts, teachers, designers, engineers from different fields. The teachers do well in different majors, such as the basic design, structure design, displays & jewelry design, crafts design, crafts production, material research, engineering design, marketing and other related design fields. In this case, this team is of professional depth and breadth and certain knowledge of regional economy, which will enable the better development of teaching and the diversity of design on the recycling of waste materials.

Most of the materials for the design teaching class are from Guangzhou Sino Trend Industries Co. Ltd and Guangzhou Framework Decorative Design Co. Ltd. They provided a lot of remaining materials, leftover materials; in addition, according to the class, students collected some second-hand items. The subject requires students to redesign the materials' structure, color, nature, surface characteristics. In the redesign process, the molded waste materials shouldn't be "melted down" or "crushed", only need to redesign creatively on the basis of the original shaping, and retain their cultural memory as much as possible. Try to create them into new products, with a new life, showing low carbon & recycling design concept. In the early stage of design, students are guided by the teachers of the team to use their powerful inspiration and imagination in the creative job. In the stage of deepening design and practicing, according to the needs of different works, directors of enterprises and college teachers will do the guidance alternately, so as to give full play to the role of collaboration.

#### B. *Teaching direction*

During the creative process of redesigning of waste materials, first of all, pay attention to the characteristics of waste materials, including the nature and the craftsmanship. Students are required to focus on the characteristics, and to reflect the design concept of low carbon and ecology. The inherent characteristics of waste materials are decided by their component, deconstruction or the marks of use, which are not

confined to any external conditions but shown naturally while being used. The characteristics of the machining and surface treating crafts will become some decorative symbols of the works and produce a great value for the redesigned works. So, while redesigning and producing, the inherent characteristics, the machining and surface treating crafts and the plasticity of the waste materials should be considered so that we can get products with better structure and properties, expressing designers' ideas properly.

Secondly, the value of cultural memory of the waste materials should be brought into play. In the context of contemporary design, to maintain the characteristics of a single item of waste materials and to achieve the mutation of impression by repeating single item or regular quantitative combination are necessary, and above all, the cultural memory value is greater emphasized. Waste materials, a kind of used material, witnessing the life of a historical period, contain certain historical or cultural stories. The better we display the cultural memory of waste materials, the better we show the value of recycling of waste materials and sustainable development. In order to convey well the cultural memory of the product to consumers, designers need to make a good plan to retain the traces of use before production. These traces may be a kind of historical culture, a fragment of memory, a way of life, or perhaps a scene of long time ago, or a kind of habits. In short, these waste materials are bearing certain cultural memory, which will produce different emotional memory to consumers.

Finally, combine the aesthetic consciousness of art of the time to the traditional art in works. Progress in science and technology has a great influence on art, so to combine the aesthetic consciousness of modern art to traditional art of crafts is a necessary thought in upgrading the recycling and redesigning. The combination of the new taste of art and the new technical of reusing the waste materials, modern and tradition, science and art, enable the modernization of upgrading the recycling of waste materials. Traditional arts and crafts are of certain technical, and can be adapted to the nature. They are usually inherited in some single ways, which makes them kind of arbitrary and experiential. They are the symbol of national culture, reflecting people's lifestyle, spiritual beliefs, values and living conditions of an era. The aesthetics of the time reflects consumers' appreciation of beauty, and the appreciation is emotional, originated from the heart, so this kind of "beauty" is "the highest state of mind". Therefore, the combination of the contemporary aesthetic consciousness and traditional arts and crafts will lead the recycling and redesigning to a higher state.

### C. The practice teaching module

The research and practice module one: "Touch Me".

In this module, the main task is to understand all aspects of the waste materials by touching and feeling them. Students will touch and play with the materials to study their features and traces of culture, and sometimes they can also measure the size and draft. In this step, in the way of "Touching Me", deal with the materials artistically to form the aesthetic image of the materials. The premise is not to change its physical

property by melting, crushing or other means, but to do the creative work without changing the original material. Only consider displaying the beauty of the shape and highlighting the characteristics of the materials, but no need to consider the function and structure of the product. Try to dig out the inner beauty of the materials, and create a new effect, showing the other valuable aspect of the waste materials.



Picture.1. Touch Me — Getting Familiar with the Materials

The research and practice module two: "Innovate Me"

Through the practice of "touch me" in module one, students get familiar with a variety of waste materials. Next, stick to a certain kind of waste material, and make a deeper analysis and discuss the direction of the redesign and reconstruction. Under the guidance of the concept of low carbon cycle, using modern design techniques of deconstruction and restructuring to make the waste materials into new products. During the creation process, emphasizing the inherent characteristics, crafts the cultural memory value to make the design expressive, so that the reconstructed waste materials will have new functions, and their life will be lasted, providing a new way to the recycling. At the same time, it's necessary to combine modern aesthetic consciousness of art with the traditional arts and crafts, and develop new craftsmanship. Besides, try to make the reconstructed products of waste materials become the goods of quantitative production, and then expand the possibility for commercial use.



Picture.2. Innovate Me —The Innovative Reconstruction of the Materials

## III. COLLABORATIVE CREATIVE DESIGN TEACHING ACHIEVEMENTS

Many sides, colleges and enterprises, teachers and engineers, collaborated for many aspects: scientific project research, professional fields, theories and practice. Therefore,

we've got twice of our teaching achievements with the effort. Design practice was under the guidance of the design theory and solved the problems in teaching practice. Some works of the subject of the collaborative research project are in the following:

Title: A Psalm of Life -- Attraction of Static

Materials: abandoned red wine bottles, clay

Designer: Tan Yawan

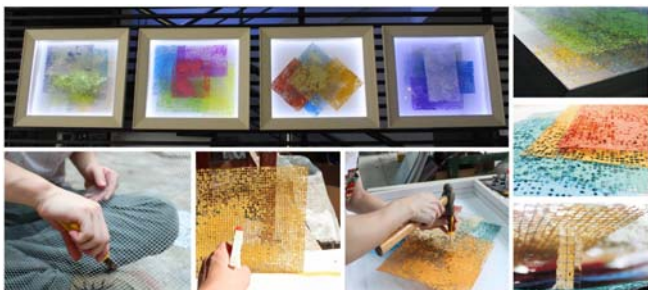
The works show a strong vitality. Based on the dialectical thinking of the beauty of the shape, the designer took the waste wine bottles as the medium to study the value of sustainable development and ecological aesthetics. The works mainly emphasize on the match of the materials. The match of see-through glass and the plain clay shows whole new form semantics. Combine these two materials of clay and cut wine bottles in a high temperature and finally got a new life, with a new meaning.



Picture.3. A Psalm of Life -- Attraction of Static

- Title: "Paper and Net" Decorative Painting
- Materials: industrial remains – wire mesh, discarded paper
- Designer: Chen Jianping

In our daily life, not all items become rubbish after being used, but depend on our discovery. Even the plain, worthless materials can be created into new products with the design concept of recycling. Designers reformed the industrial remains – wire mesh and discarded paper. Pulped the discarded paper and mixed it with color, and then scattered it on the wire mesh, dried it over the oven to make a colorful and layering decorative painting.



Picture.4. "Paper and Net" Decorative Painting

- Title: Sailing Screen
- Materials: leftover materials --PVC, acrylic
- Designer: Huang Yanyun

The designer collected the leftover materials of --PVC pipes, through cutting and reconstructing, with the lamplight effect, and the ingenious combination between the materials, to change the waste materials into the personalized modern screens of concise style .Works from both the color, shape, material are creating a modern atmosphere. Not only embodies the life's mystery, but also shocks people's feeling, fully fulfilling people's visual enjoyment.



Picture.5. Sailing Screen

- Title: Combination-Rhyme of Aromas
- Materials: abandoned red wine bottles, waste wood
- Designer: Chen Yinyin

The designer took the popular role of modern city life -- abandoned red wine bottles , as the materials, in order to remind you, who are busy with working, of stopping the busy footsteps to think over your pursuit. The work is made of a waste wine bottle. After being deconstructed, the bottle was producing a harmonious and elegant atmosphere, and then the deconstructed parts were reorganized together to form a completed and perfect whole. By connecting the wine with tea, the work shows us that the recycling of the waste will bring people a better quality of life.



Picture.6. Combination-Rhyme of Aromas

- Title: Return
- Materials: Waste leaves, leftover materials -- wood
- Designer: Chen Lingling



The leaves of deferent length and size were rolled and stuck together; just like that they are embracing each other tightly to declare to people that they are achieving another value of life. Look at the scene in the other side of the screen through the leaves cylinder, and you may be attracted by the beauty as what you find in nature. The overlying of pieces of sideling leaves is like waves, and also like the leaves dancing in the wind. Every part of the screen reveals the beauty of nature.



Picture.7. Return

#### IV. SUMMARY

"The teaching and research of design on the recycling of waste materials" project is continued.

Through the practice on "The teaching and research of design on the recycling of waste materials" project, we realized that design is a comprehensive interdisciplinary. Innovative design, science and technology, superb craftsmanship, collaboration as well, are necessary and important elements. There are many factors affecting the final product: market demand, product positioning, design, material selection, engineering technology, social responsibility, environmental protection technology etc. Thus, collaboration can promote innovation.

Collaborative innovation of design teaching will provide us a good platform for the exchange of learning. Different from the traditional isolated teaching, On one hand, it allows the school and enterprises to strengthen the interaction between research and production, and improve students' social adaptability and expand their horizon; on the other hand, it allows more designers of different professional fields to discuss the same works, so as to improve the mutual professional level of theory and practice, to speed up the design and production progress, and to enhance the competition ability of the enterprise.

Collaborative innovation of design teaching may face many problems, but it will benefit the school teachers, students, or the enterprise engineers a lot, providing us and the society with both opportunities and challenges. Hope this collaborative innovation of teaching and practice will be perfected gradually in the near future.

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