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Modular Design in Fashion Industry

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ABSTRACT

"Modular design" is a kind of design mode that not only can made clothing more interesting, makes the wearer can participate in choices, increase the possibility of clothing style .but also can extend the service cycle of clothing. In this "fast fashion" run market, the design idea of modular design can be a breakthrough point, help us find the way to balance the low-carbon and environmentally-friendly need and fashion. The article will combine the existing examples put the modular design summarized into three categories: component modular design and geometric modular design and compounded modular design.

Keywords: Environmental Protection, Fashion Design, Low Carbon, Modular Design.

With the rapid development of economy and living standers, consumers have enough money and gradually pay more attention to their appearance, consumers began their chase of fashion in the city life, and that is the background of how so-called fast fashion emerged. In the 1980 s, the concept of "fast fashion" was put forwarded in the field of fashion design. Its initial purpose is to let ordinary people able to enjoy quickly updated fashion by cheap prices. Indeed, the presence of fast fashion is really narrowed the distance of the popular and fashion, however, the waste of resources caused by the short service cycle, has aroused wide concern in the society. That is why the keywords such as green, environmental protection and low carbon can become hot spot of the whole garment industry. From the production of raw materials to processing, from fabric processing method to dye selection, from concept to product packaging design, from the post-processing reconstruction of old clothes to recycle, everybody is trying to advise on apparel industry transformation. Fashion designers are also more likely to update their ideas about fashion and design, incorporating sustainability and green concepts into the design.

Nowadays we have many design method, the "modular design" as a kind of green design is no longer a fresh thing, in the home design, electronics, automobile and other fields have had excellent performance, and in the field of clothing, the idea of modular design also attracted a lot of stylist, made

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a number of cases. Modular design itself, however, thanks to the great diversity it have, the modular design is often integrated into the "multi-functional design" concept, of course, by modular design can achieve the effect of the multi-function design, but actually modular design can realize more possibility, therefore, this article specially combined cases with modular design, then do some classified and discussion, Hope it can bring more open field of vision for designers who focus on environmental protection.

1. The concept: Environmental value and application status of modular design

1.1 Concept of modular design

So-called "Modular design", simply is the product of the certain elements together, form a specific function subsystem, the subsystem as a universal module and other products elements on a variety of combination, constitute the new system, produce a variety of different or the same functions and performance of products. The modular design in clothing exactly dismantling the clothes to different parts, and each part as a module can be disassembled to restructure with others. Modular design make the clothing no longer regarded as a complete product, but as a whole composed of multiple modules. These modules can be integrated as the owner like and concluded the endless possibilities.

1.2 The environmental value of modular design

The value of modular design is embodied in the three main features.

The first feature is diversity. Modular design make clothing pieces, on the one hand, let the wearer involved in the process of choice and assembly, greatly enhanced the interestingness and interactivity of design, can maximize the care to the wearer's emotions, to actively participate in the design of the wearer, the half proposition design way to convert design from one-way output to two-way interaction. On the other hand, modular design can change the clothing style through different module assembly, it can meet different needs and extend the service cycle of clothing as much as possible at a lower cost.

The second feature is flexibility. All ordinary clothing products have to undergo five processes included design, production, sales, use and discard the use. Compared to the general form of clothing, modular design of clothing has a high degree of flexibility in each process, the seller can design, produce and sales module according to market demand, the buyers can also abandon the module they don't need and only keep the useful parts. Modularity enable to achieve efficient resource allocation and low energy consumption, that's exactly what the low-carbon environment needs.

The third feature is continuity. This is a unique characteristic of modular design that general clothing does not have the function of. Modular design can be used only in one garment, can also be used in a range of products, it can also be used in a series of products. When a set of modular standards apply in a number of series products of long-term, module bought this season can even and combine with the module of next season even the next season. That’s the best way to gain the value of environment protecting.

1.3 The application of modular design

The concept of modular design in the clothing aspects still not mature enough, lack of practice and application, most of domestic modular design mainly service for the realization of multi-functional, basically stay on the level of single product modular design which without a deep study of modular design potential. Abroad modular design obvious explore more deeply, not only in conceptual design but also in garment design and marketization. in terms of scale, they not only have a single product modular design, but also have a series of modular design product, there are even have modular design can across several seasons and create a unique production marketing chain; In the design aspect, they also carried on each kind of exploration, excavated the modular design possibility. However, compared with other forms of design, the development of modular design is still not mature enough, and its market value has not been fully developed yet, but there are still have great development value and possibilities.

2. The classification of modular design

Modular design is focused on how to disassemble the module, the different disassembled form and degree will bring different advantages and disadvantages, for example, the degree of dismantling more meticulous, the unit module smaller, the splicing methods more flexible, free play space is also bigger, however, this does not mean dismantling is more detailed is better, because the wearer in addition to have the demand for design, have convenient demand as well, with dismantling is meticulous, match line is more, operation is also more and more trouble, it will reduce the participation of the wearer. Thus, in modular design, the choice of disassembling is very important. Therefore, this article, according to the different disassembly form, can be divided modular design into three categories: The component modular design of the basic clothing form is retained, the geometric modular design is separated from the basic garment shape and the compounded modular design is adopted both. The following will be combined with the existing modular design case for analysis and collation, this article will go into details about it.

2.1 Component modular design

The so-called component modular design, that is, to retain the basic form and structure of clothing, clothing will be disassembled into two or more than two modules. Parts of the modular design is a departure from the original form of the clothing design, that is to say break up the whole into parts, each part of the module is part of the clothing, have specific functions, to ensure the module in combination, can restore the original shape of clothing. Here, in accordance with the functional attributes of modules, the component modules are refined into two categories: single function module and Multi-function module.

2.1.1 Single function module

As the name suggests, a single functional module means that a disassembled module only has a fixed function, and a module has only one form of splicing. The decomposition of a single functional module only needs to be taken apart from the complete garment, which is the simplest, and therefore the most widely used in the market.

Fig. 1: A shirt of Lemaire studio.

Such direct disassembly can be simple or detailed. Simple as the brand Lemaire establish by two designers named Lemaire Christophe and Sarah-Linh Tran, they had a shirt that can remove the collar, as shown in Figure 1, the designer only for clothes and dismantling the shirt collar two modules, by replacing the collar module realizes the style changes, but changes in such a simple way of dismantling is very limited, and not really play the real value of modular design.

Fig. 2: Threadlab studio's modular DIY shirt.

Detailed as the Threadlab studio launched modular DIY shirt, as shown in Figure 2, the designer divided the shirt into four modules: clothes, collar, cuff and chest pocket. The body has two kinds of modules include long and short sleeved, collar, cuff and chest pocket respectively provides several different styles of modules, after the buyers are free to choose the components module required they complete assembly by ironing. This way of dismantling is more detailed, but also has greater freedom. In addition, according to the unified specification component can realizes the transboundary use, it means that the module of collar can be used not only in this body module, can also be used in another body module, greatly enhancing the generality of each module.

Generality in the modular design of the Bernice Pan's brand DePloy (as shown below in Figure 3) is more outstanding, the shirt of Lemaire only in single style which uses modular design approach, Threadlab uses modular design methods in the category of men's shirts, and the brand DePloy obviously go further, it continued to use a modular design approach in multiple seasons products, that is to say the DePloy series module can be used not only in this season, and can also be assembled with

the module of next season or another season. Therefore, the service life of modules is extended as much as possible, and the value of modular design is also more showed.

Overall, the single function module design no matter simple or detailed own the same thinking from which direction all from "whole" to "parts", single function module design is simple and direct, is the type most easy to achieve market-oriented.

Fig. 3: DePloy brand clothing.

2.1.2 Multi-function module

Multi-function module means that the module has two or more than two functions, each module of the garment if you want to achieve multi-function, in addition to simple disassembly like component modular design, but also through the conversion method to achieve.

The conversion method has two basic methods: the openings conversion method and the role conversion method. The opening conversion method signified that achieve the effect of Assimilation of conventional garment openings when design, such as the size of the collar opening and cuffs opening can be assimilated, and then cuff decoration module can be transformed into the collar decoration module, what's more, the conversion of cuffs opening and leg opening, or the conversion of collar opening and hem opening can also be a good example.

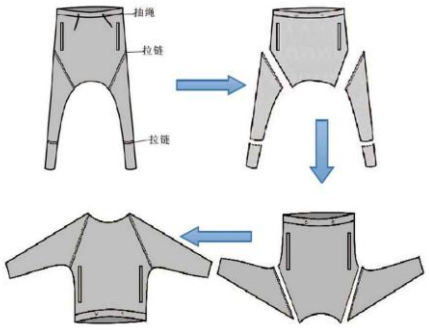

Fig. 4: Multi-function leisure wear design by Liu Guirong.

Role conversion method is to change the clothing from the original role to other roles, such as positive and negative swaps, pants change skirts, sleeves change trouser legs and so on. Liu Guirong in the article "Design and development of plate type of leisure wear in Multi-function youth clothing" showed a design has a very strong representative (as shown in Figure 4), the armhole depth of the style was enlarged and assimilated to the thigh leg opening. And the module has two functions, be the sleeves or be the trouser legs. At last, realize the conversion from the role of jacket to the role of pants.

Compare to single function modular design, multi-function modular design have more space of design, nevertheless, it is a challenging task for designers because multi-function module design also more difficult.

2.2 Geometric modular design

Geometric modular design is different from the component modular design. The way geometric modular design dismantling the clothing out of the basic form of clothing usually have, it dismantled into geometric shapes such as triangle, quadrangle or polygon and so on, the geometric size of the module can be small or large, clothing can be formed from one kind of geometric modules can also be made of various geometric modules, the splicing way can be flat, and also can be three-dimensional. Geometric modular design have more flexibility than the component modular design, a large number of replication modules is used, once between the module and the other module have a unified size, the modules can replace each other like Lego blocks, as long as the user is willing to, even the geometric module can be assembled into hats, belts, bags and other accessories.

Fig. 5: The zipper dress design by Sebastian errazuriz.

In 2009 the zipper dress can be represented (as shown in Figure 5), designer Sebastian errazuriz said: "The zipper skirt can become dinner dresses, T-Shirts, belts, bracelets and even mini skirt." The zipper skirt is provided with 120 separate zippers, each of which can be partially or completely

removed. The skirt changes style through increase or remove the zippers. He regards long strips of fabric as geometric modules and hope that through such geometric modules to achieve different styles of assembly.

Fig. 6: Geometric modular design by Bolor Amgalan

It happens that there is a similar case, The design of Bolor Amgalan (Figure 6) is a series of geometric modular design too, compared to the former case, designer made more attempts in the dismantling of the module, his created the module for quadrilateral module and strip as basic elements, mainly through the embedded way making clothing as building blocks.

It is worth mentioning that the geometric module has a more obvious advantage in resource protecting, because in the process of use, the same module can obtain new styles only by changing the assembling method, and in the process of discarded, the loss of geometric module is smaller as well.

2.3 Compounded modular design

However, component modular design and geometric modular design is also not so quite distinct from each other, the middle zone between the two kinds of modular design belongs to the compounded modular design.

Designer Chen Weihong's graduation work "Modular Cycle" showed series good fusion about component module and geometric module, as shown in Figure 7, is a body module is a component module based on ordinary dress, and the module as a skirt decoration is geometric module removed from the basic form of garment, the geometric module itself is not fixed, by snap fasteners, it can be the skirt, can be a cloak, can also be a simple decoration. In this series, designers flexibly use different forms of modules to achieve the component module assembly, such a compromise choice presents a different look, enriched the possibility of modular design.

Fig. 7: Chen Weihong's graduation work "Modular Cycle".

3. Modular design splicing

In addition to disassembling modules, how to splicing module is another focus of modular design. At present, the common splicing techniques and the main features of several types of Table 1, including buttons, snap fasteners and zippers due to simple operation is the most commonly used, knot have strong decorative effect, but poor stability. Embedded technique is novel and interesting, but only for the stiff fabric, usually used for air layer fabric. Although the thermal activation adhesive film is convenient, but the cost is high, and the modules could not be disassembled again, which is not conducive to the repeated use.

Table 1: Modular design splicing

Splicing technique	Features
Button/ snap fasteners	Cost low, easy to operate.
Zipper	Easy to operate, but too much influence on comfort
Knot	The adornment effect is strong, the stability is bad
Embedded	Easy to operate, but but only for the stiff fabric
Thermally activated adhesive film	Good stability and convenient operation, but the cost is higher, and cannot be disassembled again

In the actual application of splicing technique, there are two kinds of expressions: recessive and explicit. Recessive is to try to use the same color, reduce the volume of splicing tools to reduce the sense of presence, the explicit prefers to use the color matching, amplify splicing tools to emphasize the sense of presence .

4. Conclusion

If the design mode of components modular design is break up the whole into parts, then the design idea of geometric modular design is from parts to the whole, and the idea of compounded modular design is wandering between the two.

Combined with the examples in this paper, we can see that modular design is essentially an inclusive design technique. Module dismantling way is free, and can be disassembled into components, but also can be disassembled into geometric modules, even both the continuity of the module; the set of continuity is free, modular design can be used in a single product, but also can do the modular design in the series, also can do the modular design in different seasons; the size of the module is free, can be disassembled simple, also can be disassembled detailed. It can be said that the space of the modular design is very large, the above cases are, I suspect, just the tip of the iceberg. In today's fast fashion market, how to use modular design to achieve the balance of environmental protection and fashion is still worth explored.

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