

Research on Technology and Fashion Design from the Perspective of Cross-border Thinking

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Abstract—This paper studied the combination of science technology and fashion design from the perspective of cross-border thinking. The paper introduces the categories and characteristics of crossover design respectively between industry and industry, designers and artists, brand and brand, and science technology and fashion; focuses on the technology and fashion fusion of crossover design methods; combines with case study research respectively from the combination of fabrics of new technology and fashion design, the combination of intelligent equipment and fashionable design, the combination of 3D printing technology and fashion design, and the combination of intelligent technology and fashion design; puts forward the integration and application value of technology and fashion, which includes the injection of new design elements into fashion design by scientific and technological intelligence, the promotion of fashion innovation and research and development of new materials and functions, and the incubation of new ecology for fashion industry by science and technology.

Keywords—Crossover; Science and technology; Fashion; Design

I. INTRODUCTION

With the development of science and technology, crossover design has become a kind of design thinking recognized by different industries. The development of science and technology has brought new thinking and technological revolution to traditional design. The study of different cross-boundary design methods between science and technology and fashion can help inspire designers, enrich the types of fashion design and promote the interaction between fashion and science and technology. This paper mainly studies technology and fashion design from cross-boundary perspective, while fashion design mainly studies the field of clothing and fashion design.

II. CATEGORIES AND FEATURES OF CROSS-BOUNDARY DESIGN

Crossover design refers to two or more fields fusion design, it represents a new way of life attitude and aesthetic fusion, the greatest benefits to a brand is to make irrelevant elements, mutual penetration, integration, so as to give the brand a stereo feeling and depth, creating a new kind of aesthetic form. Entering the Internet era, with the new technological revolution, the scope of cross-border is more obvious and extensive [1]. Designers develop creative activities on the basis of a certain industry rules, and design thinking, with the purpose of this design method to consider product appearance design, visual

experience, function, structure, material, safety, practicality, comfort and so on, to design a good product, these factors must be considered, which itself requires cross-border thinking for designers. In recent years, with the deepening of cross-border thinking, the scope of cross-border design has become more and more extensive [2]. The integration and innovation of art and design, fiber art and three-dimensional sculpture, clothing design and industrial design, product design and architectural design, traditional technology and modern science and technology have added new connotation and creativity to cross-border design. In this study, crossover design is summarized into the following four aspects:

- Industry and industry crossover. The biggest advantage of cross-boundary design among different industries lies in the complementary advantages of different industries, exceeding the limitations of a single industry. For example, FILA, a famous Italian sports brand, announced a cross-border cooperation with Pepsi, the global beverage giant, to launch a new capsule series. PEACEBIRD WOMEN and Pepsi fall collections are designed with an interest in vintage clothing in a new style. "In-ei" lamps designed by Japanese fashion designer Issey Miyake for Italian light brand Artemide were exhibited at Milan design week in 2012. Louis Vuitton has teamed up with New York artist Jeff Koons to design new bags and accessories. Adidas has teamed up with Porsche to design a lightweight, minimalist running shoe Bounce S4 Lux.
- Designers and artists crossover. Art and design are mutually integrated. Artists' works can add more artistic value and design elements to the design through various forms, and bring diversified design inspiration and resources to the design through patterns, colors, shapes and so on. For example, the creation brought by artist Jeff Koons for Louis Vuitton reproduces the masterpieces of classical masters such as Da Vinci and titian on classic styles such as bags, chain bags and backpacks. Japanese artist Yayoi Kusama cooperated with French luxury brand Louis Vuitton to design a series of limited edition high-quality goods, and also used a lot of wave point elements in store display. Yves Saint Laurent teamed up with artist Mondrian to create the classic Mondrian dress.

- Brand and brand crossover. Brand and brand crossover design is mainly the cooperative design between different brands in the same industry. For example, UNIQLO cooperated with well-known British fashion brand JW ANDERSON to launch a new joint series. Fast fashion brand H&M has launched a series of cooperative designs with other brands every year since 2004.

TABLE I. TABLE STYLES SUMMARY OF CROSS-BOUNDARY DESIGN BETWEEN H&M AND OTHER CLOTHING BRANDS

Year	Cross-border brand	Brand category
2017	ERDEM	Dresses
2016	KENZO	Menswear and womenswear
2015	BALMAIN	Street leisure
2014	Alexander Wang	Sports and leisure
2013	Isabel Marant	Women's wear
2012	Maison Martin Margiela	Structuralism
2011	Versace	Renaissance style features
2010	LANVIN	Perfume brand
2009	Sonia Rykiel	Underwear & knitwear
2009	Jimmy choo	Shoes and handbags
2008	Comme des Garcons	Fashionable avant-courier
2007	Roberto Cavalli	Underwear and accessories
2006	Viktor & Rolf	Evening dress for men and women
2005	StellaMcCartney	Womenswear
2004	Karl Lagerfeld	Womenswear

- Technology and fashion crossover. Science and technology and fashion design is mainly crossover between science and technology field and fashion field, including new technology, new materials, new technology and new equipment. The development of science and technology has injected new vitality and design elements into fashion design. Intelligent wearable products, functional clothing, virtual display, intelligent sales and so on are the latest technology and fashion crossover design [3].

III. THE METHOD OF INTEGRATING TECHNOLOGY AND FASHION INTO CROSS-BORDER DESIGN

A. Combination of new scientific, technological fabrics and fashion design

Technology and fashion seem to be unrelated to the two industries, in recent years, cross-boundary design has led to the emergence of new clothing materials, such as TPU, laser fabrics, mirror fabrics, acrylic, coated fabrics, fiber fabrics, cotton filled fabrics, composite fabrics, dupont paper and so on. These materials break through the traditional natural materials and chemical fiber materials, and make use of new technology to endow clothing fabrics with different appearance properties, structural functions and practical values [4].

Luminous fiber fabrics experienced the red carpet at the 2016 Met Gala. Zac Posen used transparent organza containing fiber as the luminous material, and sewn 30 mini batteries inside the skirt to provide light source energy for the dress, which is very novel and beautiful. Luminous fiber fabrics are widely used in home textiles, such as curtains and tablecloths. It is also possible to use a small battery powered by a wire for clothing, which is equipped with a small battery that can power for eight hours to make it glow. In addition, there are many small USES of luminous fiber fabrics, such as the layout of nightclub scene and some safety works.



Fig. 1 Zac Posendesigned high-tech dresses

The luminescent fiber cloth relates to a colored luminescent fabric, which belongs to the field of garment processing fabric. Luminescent fiber cloth for the table in the tissue layers and double layer structure, table structure is composed of color luminescent fiber weaving, the fiber need to be charged to small batteries as long as two hours, according to the remote control can emit red, green, blue, dark blue, purple five different colors of light, increasing the visual effect of the fabric itself. The inner layer is woven with cotton fiber and bamboo charcoal fiber to ensure the comfort of the fabric.

In this study, luminous dress is taken as a case of cross-boundary design of scientific and technological materials and clothing. In combination with the fashion trend of 2018, designed luminous dress with large skirt. In terms of fabric design, luminous fiber fabric is adopted, which is composed of 60.8% polyester fiber, 28.2% new synthetic fiber and 11% nylon fiber. Luminescent fiber fabric is a kind of high-tech textile fabrics, the luminous fabrics based on the use of an optical fiber, the optical fiber can be combined with all of the natural fiber or chemical fiber, textile into all kinds of textile fabrics, and can meet the requirements of the textile process after finishing, the fabric is the main reason of the light supply a current of low voltage of 3.6 V.



Fig. 2 Design draft of luminous dress with fiber optic fabric

The main highlight of this dress design is the self-luminous dress, the fabric has two kinds of horizontal sewing and vertical sewing, in order to the final effect of the dress beauty, the fabric use vertical sewing. The skirt is divided into eight pieces, each with a small battery. When the skirt does not shine, it is

just like a normal dress skirt. It can be controlled by mobile phone APP or special remote control to make the dress emit colorful light according to different modes of control.



Fig. 3 Smart phone control and remote control

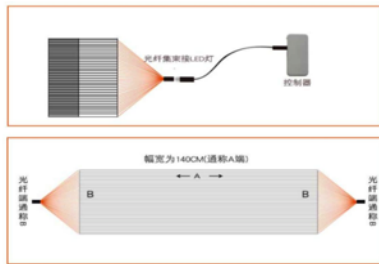


Fig. 4 Internal structure and schematic diagram of optical fiber material



Fig. 5 Dress natural light effect



Fig. 6 Dress effect in variety of luminous state

B. Intelligent equipment combined with fashion design

Digital printing machine, computer embroidery machine, high-speed flat sewing car, laser cutting, computer automatic cutting bed, digital hanging system and computer mapping software, virtual fitting technology, 3D printing, three dimensional body scanner, etc, with the development and application of intelligent equipment makes the clothing design, production, dissemination and sales more convenient and efficient.

This research with the combination of digital printing, computer embroidery and garment as a case for the design of costume style, creative design to modern city toward women's

clothing style, refined in 2018 of the latest popular element and color, extract the Stockholm city inspiration on clothing design elements, design four different patterns in the form of illustrations, combined with modern digital printing technology and computer embroidery technology, build a rich texture of plane and solid visual effect.



Fig. 7 Series of clothing design draft



Fig. 8 Pattern design

Pattern is one of the biggest highlights of this series of design, with the help of modern digital printing technology to express. Digital printing is divided into inkjet printing and transfer printing, because the main fabric is composed of 100% polyester components, so the transfer printing process is better.

Transfer printing is a printing method in which dyes or coatings are printed on paper to obtain transfer paper according to pattern patterns, and then dyes on transfer paper are transferred to textiles under certain conditions. At the very beginning of printing, the patterns are edited and modified by the computer for different degrees of color matching, and the pattern samples are printed. After confirmation, the four pattern specifications are typesetting, and the cloth is 15 meters long. The pattern is printed on the transfer paper, and then the machine is adjusted to 235 degrees for pressing. The transfer paper and the fabric are pasted together face to face, and the pattern on the paper is transferred to the fabric..



Fig. 9 Digital transfer printing process



Fig. 10 Series product effect

C. The combination of 3D printing technology and fashion design

From the perspective of data technology application to clothing, 3D printing technology is the most prominent, with exquisite detail structure and full of visual impact of science fiction. In recent years, the rise of 3D printing technology has brought more possibilities to the field of clothing design. For example, Iris Van Herpen, a famous Dutch designer, released her autumn and winter collection with the theme of "clarity" in 2016 Paris fashion week. London designer Catherine Wales designs a 3D printed molecular corset.



Fig. 11 3D printing garment design effect

This study with 3D printing technology combined with fashion design as a case for garment design, style design with zipper short skirts, shorts overlap jacket, 3D printing decoration sleeve and skirt edge and artificial tin grey Brazilian leather fabric chosen as the main body fabric, transparent PVC fabric as decorative fabrics, ABS resin materials as a 3D printing materials. Model according to the design draft, and then 3D print according to the model.

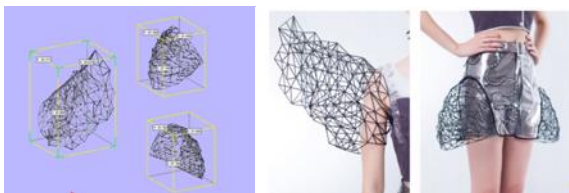


Fig. 12 3D printing model and finished product effect

D. The combination of intelligent display technology and fashion design

With the rapid development of Artificial Intelligence, Virtual reality and Augmented reality, the cross-border integration of digital media art and fashion design has become more and more in-depth. Virtual fitting experience [5], artificial intelligence purchasing experience and holographic image clothing display design have become mature cases of fashion and technology crossover design [6].

IV. INTEGRATION OF TECHNOLOGY AND FASHION DESIGN APPLICATION VALUE

A. Scientific and technological intelligence infuses new design elements into fashion design

The development of scientific and technological intelligence has brought new design inspiration and elements to the field of fashion design, such as space elements, laser fabrics, luminous fiber clothing and so on. These new elements are exactly the new design elements brought to designers by the development of scientific and technological intelligence. In addition, with the emergence of intelligent equipment, digital printing, computer embroidery, virtual display, laser cutting, sewing technology such as 3D printing, automatic equipment for garment designers in the design development, pattern design, materials development, display, etc, designers have a wide variety of choices. It makes the design more flexible and divergent thinking, and diversification of fashion design [7].

B. Promote fashion innovation and research and development of new materials and functions

With the development of science and technology, fashion designers no longer only develop conventional fabrics and design methods of clothing structure, but also develop diversified clothing products with the help of science and technology. Such as location and the intelligence of heart rate watches, intelligent test of outdoor clothing, luminescence materials cloth, one-time molding 3D printing cloth and so on, designers can develop new products combine with science and technology, materials science and technology according to different clothing needs, it will be the future development trend in the field of fashion design.

C. Technology incubates new ecology for fashion industry

Virtual fitting technology mature, non-contact anthropometric data, holographic imaging technology applied to fashion show display, etc, there is no doubt that promoted the new in the field of fashion and related ecological, intelligent equipment, computer, artificial intelligence, mobile phone APP, smart sales, and so on contact with the fashion industry is more and more close, and derived a new correlation industry, such as network marketing to promote the intelligent virtual network sale, the fitting, augmented reality show, data statistics, network advertising, customer service, express delivery industry, etc. With the continuous development of science and technology, technology has injected new impetus into the fashion industry, new fashion industry ecosystem will be more and more large.

V. CONCLUSION

In today's increasingly fierce market competition and the development of science and technology, the boundaries between industries are gradually being broken, and within a certain range, industries have been integrated with each other. Under the background that the country strongly advocates the cultural and creative industry, cross-border integration between different industries, especially the science and technology and design industry, is prevalent. This paper mainly studies the method of combining science and technology with fashion design and analyzes practical design cases, and puts forward the application value of integrating science and technology with fashion at present. The combination of science and technology and fashion can promote the maximization of resources, improve brand value and bring different user experience to consumers, which can make the effect redoubled.

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