

Research on the Application of Modular Virtual Design in the Customization of Blue Clamp-Resist Dyeing Garments

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Abstract: In view of the current practical difficulties faced by Wenzhou blue clamp-resist dyeing, this paper makes an in-depth analysis of the culture of blue clamp-resist dyeing, carries out modular and virtual design for garments on the basis of digitalization, proposes a modular design method for garments, builds a virtual database of garments modules, and explores the research on the customization of blue clamp-resist dyeing garments based on modular virtual design by taking the four databases as the starting point. By integrating the ancient blue clamp-resist dyeing into the aesthetic needs of the current fast fashion digital life, and empowering the intangible cultural heritage with the wisdom of number, this paper provides a new perspective and thought to promote the innovation and development of blue clamp-resist dyeing, and provides a reference template for the development process and standards of enterprise advanced customization virtual design.

1. Introduction

In the regional heritage of intangible cultural heritage, although blue clamp-resist dyeing has a traditional industrial chain of handmade workshops, it still faces a sharp decline in the number of inheritors, the reduction of the scale of hand-made works and the lack of product innovation, leading to the difficulty of the inheritance of blue clamp-resist dyeing technology.

Therefore, in view of the above problems, based on the new concept of blue clamp-resist dyeing of intangible cultural heritage, combining static activation innovation with dynamic digital module library, combined with supply order analysis, capture consumer body scan data, quickly match garments patterns, styles, fabrics, patterns and other modules that fit consumer images according to cloud data, and use the means of garments module virtual design. By enabling enterprises to start the modular virtual garments customization operation process and completing the digital living inheritance and promotion of Wenzhou blue clamp-resist dyeing, it can not only carry forward the excellent traditional Chinese culture, enhance the national confidence and sense of identity, but also provide new perspectives and ideas for the innovative development of blue clamp-resist dyeing, which meets the realistic needs of Wenzhou fashion industry transformation and upgrading.

2. Overview of Garments Modular Virtual Design

2.1. Virtual Fashion Design

With the advent of the digital age, the boundary between virtual network and reality becomes more and more blurred. As the epitome of the evolution of The Times, fashion is bound to go digital. In today's 5G era, high-tech has been applied to the garments industry. More and more garments enterprises hope to carry out virtual garments design and virtual fitting with the help of virtual fashion design system. Fashion designers will fully digitized fashion by means of modern technology and create contactless virtual fashion designed for the network era.

Virtual garments technology mainly includes five aspects: 3D body modeling, 3D board adjustment, fabric attribute allocation, virtual fitting, dynamic display and so on. The most important feature of this technology is real-time presentation, which allows the garment plate and 3D effect to be simulated synchronously. In the process of simulation, the correctness and fit of the sample can be checked in real time, and the design line can be directly modified on the garment 3D model, and the plate can be automatically generated. At the same time, you can immediately see the size, color, design details and other real-time adjustment intuitive effect.

The main function of virtual garments technology is to provide a more convenient virtual interaction platform for fashion designers and pattern makers, reduce the design process, simplify the sample production module, optimize the design process and save time and cost. The technology has a strong simulation function, can directly add texture and pattern on the fabric, and through the simulation of character dynamics directly display the garments, can help everyone in a short time to quickly and intuitively complete the garments sample production, virtual try on, effect display steps, improve the overall design efficiency.

2.2. Modular Fashion Design

The concept of modularity was first proposed by Herbert Simon of the United States. It refers to a design method that divides and designs a series of functional modules on the basis of functional analysis of products with different functions within a certain range or the same function with different performance and different specifications. Through the selection and combination of modules, different products can be formed to meet different market demands [1].

Fashion modular design is based on customer demand and potential demand, garments is divided into relatively independent modules, according to the personalized needs of customers, designers can choose fabrics, colors, patterns and other modules from the module library quickly combined and matched, and finally formed a series of garments. Fashion design in the mode of mass customization is jointly completed by customers and designers. Through modular design, customers can choose their favorite clothes to the maximum extent within a certain range, and garments enterprises can use the traditional mass production mode to produce standardized garments parts, reduce the custom parts and customization links in the custom garments, thus greatly shortening the product delivery time. Reduce product customization costs. Therefore, modularity is an important measure to reduce the cost of mass customization and improve the speed of customization.

2.3. Garments Modular Virtual Design Process

The investigation and analysis of customer demand is the basis of garments modular virtual design. Garment enterprises can accurately locate the core customer group and demand set based on the investigation of customers' actual demand, prediction of potential demand and comprehensive evaluation of customers' demand. After determining the customer needs, we quickly screen the

garments style database, fabric database, pattern database and version database, and then configure the customized garments that meets the customer's expectations, so as to realize the entire garments modular virtual design application process.

Establish a pattern database, fabric database, style database, pattern database, etc., establish a one-to-one correspondence between the three-dimensional style database and garments pieces, and constantly update and optimize to realize the data and modularization of pattern. According to different needs of consumers, designers can select appropriate fabrics and patterns through the cloud for digital personalized customization. Patternmakers use modular database to directly generate component samples to quickly match garments styles, greatly improve the efficiency of garments production and development, to achieve the purpose of digital and intelligent production of garments.

3. Research on the Customization and Development of the Customization of Blue Clamp-Resist Dyeing Garments Based on Modular Virtual Design

3.1. Demand Analysis of Blue Clamp-Resist Dyeing Garments Style

Fashion style refers to the value orientation, inner character and artistic features of the fashion of an era, a nation and a school in terms of form and content. The realm pursued by fashion design is the orientation and design of style in the final analysis. Garments style is the main melody and soul of brand design, and an important characteristic that distinguishes it from other brands. It also carries the cultural connotation of the brand, shows the designer's unique creative thoughts and artistic pursuit, and reflects the distinctive characteristics of The Times [2].

In order to make the designer's research and development of blue clamp-resist dyeing garments style can help enterprises to more accurately position the market, and effectively meet the diversified needs of consumers for blue clamp-resist dyeing garments. By combing a large number of relevant books and analyzing the information data of major e-commerce companies, a total of 300 garments samples of 4 styles were screened, and finally four blue clamp-resist dyeing garments styles were concluded, namely, national style, avant-garde style, sports style and commuter style.

3.2. Blue Clamp-Resist Dyeing Garments Module Design

In the module design of blue clamp-resist dyeing garments, the basic module refers to the database of fabric, pattern, style and version, which is an indispensable module for the formation of garments. Each basic module has its corresponding auxiliary module, which has the functions required for module connection and installation. The pattern database includes Chinese element pattern, Western element pattern and blue clamp-resist dyeing pattern. The fabric database includes creative fabrics and conventional fabrics. The style database includes women's style, men's style and garments. The model database includes women's model, men's model and children's model. By setting up these databases, problems such as lack of design resources and time-consuming search are solved, and the efficiency and speed of design research and development are improved.

By analyzing and summarizing the styles of blue clamp-resist dyeing garments in the market, it is found that there is a correlation between modules and styles and between modules. Through mathematical modeling, module recommendation can be carried out in the process of customer selection, which will better help customers to customize the blue clamp-resist dyeing garments with personalized requirements. Based on the analysis of the basic modules and auxiliary modules of blue clamp-resist dyeing garments, CLO 3D software is used to conduct 3D virtual modeling and modular virtual design for each module of blue clamp-resist dyeing garments, so that customers or designers can view the virtual modeling of modules in an all-round way, and combine and configure

each module of blue clamp-resist dyeing garments on the customized platform. Thus, the online design of blue clamp-resist dyeing garments can be quickly realized [3].

3.3. Blue Clamp-Resist Dyeing Garments Customization Platform Application

3.3.1. Cases

Miss Li went to the Wenzhou Arts and Crafts Research Center and took out a blue clamp-resist dyeing cheongsam with 50 years of collection that her mother had given her at the bottom of the box. She hoped to dress up at the 80th birthday banquet for her mother. However, due to the dampness of the camphor wood box, the dress faded and deformed.

3.3.2. Customization Process

In the complete garment module database established, Miss Li can stratified and pick up parts of each module according to the virtual design process, and finally generate the blue clamp-resist dyeing cheongsam needed by Miss Li.

First, the acquisition of human body source data is the key step and cornerstone of personalized customization, and cheongsam is highly dependent on human body data. The automatic measurement of nearly 60 key dimensions of human body was quickly and accurately completed within 2 seconds through 3D scanning, and the 3D human body model was output according to the measurement scheme, the 3D human data report was automatically generated, and the 3D human body data analysis and extraction of Miss Li was completed [4]. Due to the high accuracy and convenience of measurement, it solves the difficulty of acquiring human body data in the traditional customization mode, and also brings a new experience to the customization customers.

Secondly, through the blue clamp-resist dyeing pattern library in the pattern database, the blue clamp-resist dyeing pattern that is closest to the prototype is quickly searched, and the quadrilateral continuous pattern is automatically generated, as shown in Figure 1.

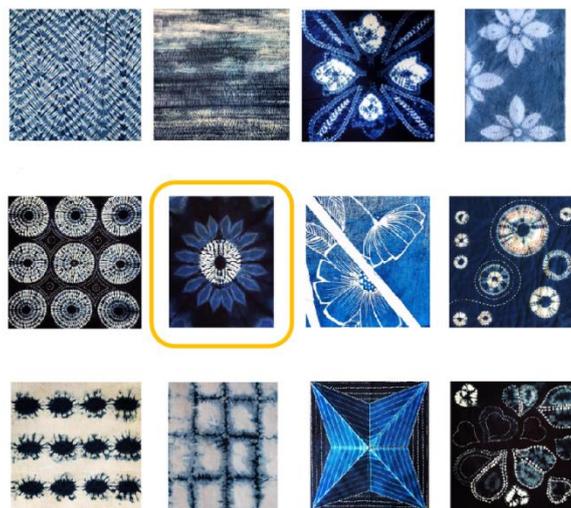


Figure 1: Blue clamp-resist dyeing pattern database to select similar patterns

Third, fabric is one of the core elements of cheongsam design. Different fabrics have different fabric drape, light sensitivity and texture. Designers can choose the fabric associated with profile, and at the same time, they can enter the fabric database to obtain 3D high-definition texture fabric. By simulating the process characteristics of blue clamp-resist dyeing, the fabric is automatically simulated and the effect of virtual fitting is reflected in real time, as shown in Figure 2.

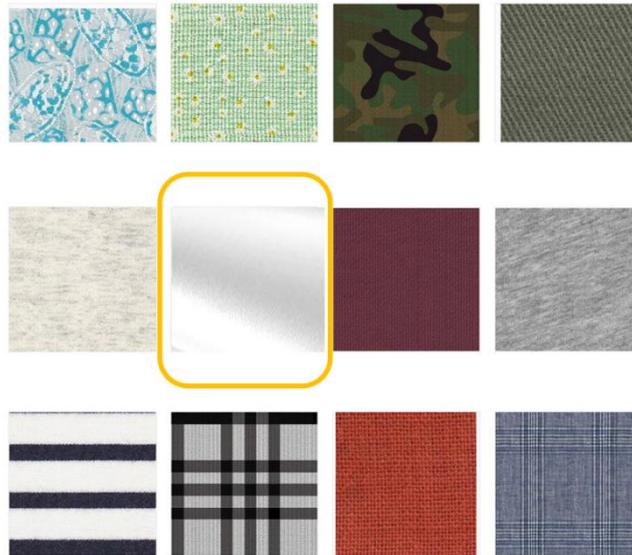


Figure 2: Fabric database Select fabrics

Fourthly, according to Miss Li's design intention, it selects the dress style of blue clamp-resist dyeing, selects the "ethnic style" for the design of blue clamp-resist dyeing, selects the required basic dress shape in the style database, and then enters the component database related to the style to modify the basic style, forming multiple combinations of collar, sleeve and other components of the cheongsam, and finally forms the required style of blue clamp-resist dyeing. See Figure 3.



Figure 3: Component combination in style database

Fifth, cheongsam has a high requirement for fit degree, but fitting is not inconsistent with comfort level. It must meet the basic needs of movement and breathing when worn by people. Relying on the garments version database, quickly find the similar cheongsam version. In the traditional customization mode, the tightness of the cheongsam is fed back by making samples and then the version is adjusted. The tightness of the cheongsam is known in advance from the grid color distribution of the pressure chart in the version database, and the comfort adjustment of the version is completed by adjusting the corresponding parameters [5], as shown in Figure 4.

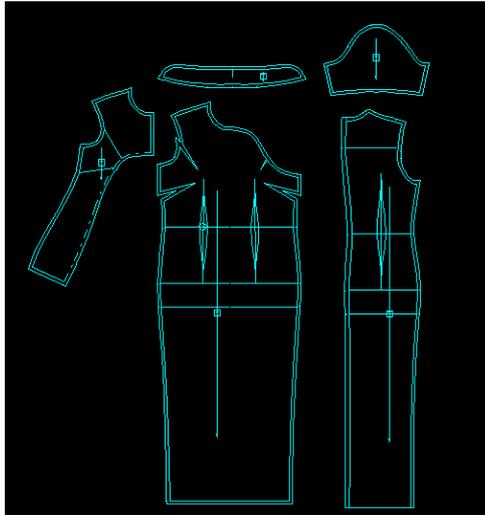


Figure 4: Select similar versions from the version database

Sixth, provide Miss Li virtual try on experience. In the virtual fitting platform, the model is rotated 360° to check whether there are holes and pulling problems on the surface of the blue clamp-resist dyeing cheongsam. In view of the fitting feedback, the paper pattern of the cheongsam can be adjusted in the two-dimensional sample window, and the fitting effect can be simulated synchronously in real time. At the same time, it can also provide Miss Li's 3D dynamic runway performance. The virtual model presents the effects of fabric and craft in three-dimensional form through body language [6], so as to help Miss Li get more comprehensive information, as shown in Figure 5.



Figure 5: Blue clamp-resist dyeing cheongsam virtual fitting

Through the above cases, it can be concluded that the number of garments modules is limited, but the garments styles obtained by the combination of modules are infinite. The choice of modularization enables customers to have more space for choice. By checking and correcting the style and structural rationality of the selected module, the molding module is utilized to the maximum extent allowed by mass customization, and the local improvement design is carried out for garments products that are closer to the requirements of customization [7]. Through the modular

virtual database intelligent customization platform, the research, development and customization of blue clamp-resist dyeing cheongsam are efficiently completed. According to the traditional research and development process, it takes at least one month, but through the blue clamp-resist dyeing modular virtual garments customization platform, the cheongsam sample only needs a few hours at the earliest, effectively improving the design capacity and reducing the development cost [8]. This is the living inheritance of Wenzhou blue clamp-resist dyeing digital, modular and virtual design.

4. Conclusions

With the improvement of our economy and people's aesthetic level, people's personalized needs become more and more obvious, and garments customization has become a major trend in the development of the garments industry. Visualization technology, interactive technology and data transmission technology are adopted to comprehensively consider the problems in style design, fabric design, pattern design, pattern adjustment, virtual fitting and so on. Supplemented by 3D body and fabric scanners, body data and fabric information can be provided for personalized customization. Through the intelligent matching of garments modular virtual database, efficient research and development of new models is completed, which solves the current dilemma of blue clamp-resist dyeing and the problem of lengthy customization process, and shows the vitality of advancing with The Times in blue clamp-resist dyeing. With the trend of "science and technology enabling fashion", the industrialization and popularization of the research results of blue clamp-resist dyeing four repositories has become a reality.

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