

# *Research on Virtual Live Display of Wenzhou Blue Clamp-Resist Dyeing Digital Intangible Cultural Heritage*

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**Abstract:** Blue clamp-resist dyeing is one of the famous intangible cultural heritage of Wenzhou, which has been recognized by the public with its unique artistic beauty. However, with the continuous progress of science and technology and people's ideas, the position of blue clamp-resist dyeing technology is also quietly changing. How to inherit and protect intangible cultural heritage has become a common concern at home and abroad. This article in view of the present blue clamp-resist dyeing show lack of product innovation, form a single, time-consuming, complex material, the design process and so on, through the traditional blue clip activation of 3D garment design and virtual digital technology shall be combined and virtual display blue clamp-resist dyeing live condition, to the traditional blue clamp-resist dyeing and modern display technology of virtual design integration in the collision, Open a new window for the traditional blue clamp-resist dyeing handicraft. So as to provide a research path of integrating theory and practice for Wenzhou blue clamp-resist dyeing intangible cultural heritage virtual live display.

## 1. Introduction

Now the "Made in China 2025" national strategy, the manufacturing industry has ushered in a rare development opportunity, 3D virtual simulation technology is also developing rapidly, this technology has been widely used in many fields. Blue clamp-resist dyeing has important cultural and economic value as Chinese intangible cultural heritage. However in recent years to start with the people's growing economic and cultural consumption demand, traditional crafts and modern consumer demand, current research about the blue clamp-resist dyeing only stay in manual cloth, cushion for leaning on, not in traditional costume design and the research field of virtual display products, compared with the traditional intangible product homogeneity competition is not in a state of advantage. Therefore, the current problems of blue clamp-resist dyeing are summarized as follows: insufficient product innovation, single display form, time consuming, material cost, complex design process, etc. All these problems will lead to a certain bottleneck in the development of traditional blue clamp-resist dyeing technology. At present, the inheritance, protection and innovation of intangible cultural heritage are imminent.

The general secretary's speech at the National Conference on Propaganda and Ideological Work and the municipal government's "Wenzhou Fashion Industry Transformation, Upgrading and

Cultivation Action Plan" have pointed out the direction for the activated development of blue clamp-resist dyeing and high-end fashion digital customization.

Artificial intelligence and innovative design of intangible cultural heritage can collide into new sparks under the environment of art and science. 3D clothing virtual digital technology is applied to the protection and inheritance of blue clamp-resist dyeing, giving full play to the innovation of artificial intelligence, effectively expanding the dissemination scope of intangible cultural heritage, and opening new ideas and perspectives for the inheritance of intangible cultural heritage.

## **2. Development status of blue clamp-resist dyeing in Wenzhou**

Blue clamp-resist dyeing is a local traditional printing and dyeing technique in Wenzhou and one of the national intangible cultural heritage. It has rich forms of expression and unique cultural space, and plays an irreplaceable role in retaining and displaying Wenzhou's regional color holding, regional culture and folk customs<sup>[1]</sup>. Due to its interesting patterns, subtle and simple colors and exquisite craftsmanship, Wenzhou blue clamp-resist dyeing has a unique artistic beauty. With the intensification of industrialization, a large number of industrial products are popular in people's life. With the characteristics of low cost and rapid production, they bring convenience to people's life. However, the homogeneous products make people miss the warm era of manual production more and more. As an ancient handicraft, Wenzhou blue clamp-resist dyeing was once an indispensable part of people's lives. However, it is hard to find its trace in today's life. In the middle and later part of the last century, under the efforts of some people who love traditional crafts, the blue clamp-resist dyeing was discovered, which attracted the attention of experts and scholars. With the Internet breaking regional boundaries and the invasion of popular culture, the cultural expression forms relying on specific regions and humanities become vulnerable, and the development status of Wenzhou blue clamp-resist dyeing is imminent.

## **3. Overview of 3D clothing virtual digitalization technology**

Virtual digitalization of 3D clothing has the characteristics of infinite design, real-time presentation, simplified process, 3D display, accurate attributes and so on.

Recently, the concept of the metaverse has been popular at home and abroad. Bytedance buys VR hardware maker Pico for more than \$9 billion to ride the metaverse train. International sports brands NIKE, Adidas and luxury brands Gucci, Balenciaga, etc., have all started to take steps towards the meta-universe and actively cooperate with virtual fashion brands related to NFT to produce virtual goods. Domestic Hailan Home and Sema clothing has also applied for registration of the metaverse related trademarks. The core value of fashion lies in self-expression through clothes and personal style. Digital fashion has become a more sustainable and efficient way, opening up the imagination for digital innovation in fashion.

With the continuous maturity of 3D technology, "3D" replaces "2D", "stereo" replaces "plane", "virtual" simulates "reality" 3D wave is rapidly set off in various fields. The clothing industry is no exception, 3D clothing design technology based on three-dimensional cutting is becoming more and more practical<sup>[2]</sup>.

3D fashion design combines 3D technology with blue clamp-resist dyeing design. Designers can design 3D clothes on the computer, that is, they can quickly transform 2D flat version into 3D virtual sample clothes by using the computer, and connect this "sample clothes" to R&D, production and market sales, so that the clothing industry can be connected from the design end to the retail end. 3D fashion virtual digitalization technology can bring better experience to customers, help blue clamp-resist dyeing establish closer contact with consumers, consumers can view the experience more intuitively, even virtual fitting, real-time feedback to designers, to meet

personalized needs, so as to realize the digitalization of blue clamp-resist dyeing industry!

#### **4. Wenzhou blue clamp-resist dyeing digital intangible cultural heritage virtual live display process**

The combination of virtual reality and real-time interaction of 3D virtual display technology makes it popular with the public. In terms of display design, these two characteristics can fully and effectively present the display content and enhance the dissemination. Nowadays, China has paid more and more attention to the protection and inheritance of traditional culture. As the intangible cultural heritage of China, blue clamp-resist dyeing has profound cultural deposits and regional characteristics. The application of 3D virtual display technology to display blue clamp-resist dyeing culture, to increase the dissemination of blue clamp-resist dyeing culture. Virtual digital technology to clothing, it can well realize three-dimensional modelling and two-dimensional planar pattern conversion to each other, the 2 d plane is difficult to show the clothing structure through the virtual three-dimensional display, technique of suture can check up the accuracy of the two-dimensional clothing structure effectively, with the organic combination of non-material cultural heritage blue clamp-resist dyeing, Through the construction of a human body model, drawing two-dimensional basic garment samples, virtual sample stitching, fabric design and virtual display of the model, this series of processes reproduce the real dress effect<sup>[3]</sup>. Garment enterprises can realize the production of virtual sample clothes, which greatly saves the production cost of clothing enterprises. At the same time, consumers can create clothes based on their own body shape through virtual fitting and other functions. The specific design process is as follows:

##### **4.1. To build a 3D human body model**

By 3D body scanner, or the traditional manual measurement methods in measuring software need chest circumference, waist circumference, specific parameters, such as selection and reality in the virtual model editor approximation of the human body size<sup>[4]</sup>, and adjust accordingly in the clothing virtual design software of chest circumference, waist and shoulder breadth dress to the size of the data needed, each part of the set data, the establishment of a complete human body model<sup>[5]</sup>.

##### **4.2. Draw two-dimensional garment basic model**

The garment virtual design platform has good compatibility with other garment CAD software. It can import the existing two-dimensional template DXF format file, and can also use the board generation tool to create in the board window, such as making polygons, rectangles, circles and internal graphics tools. The internal graphics tool can be used to map pockets, button positions or when drawing ironing lines, pleats, etc. In addition, if the points or lines that have been imported into the board need to be changed and modified, the editing board tool and adjustment tool can be used<sup>[6]</sup>.

##### **4.3. Create virtual samples**

In the two-dimensional design window of the virtual design software of clothing, the cut pieces are placed in an appropriate position according to the projection of the human body. In the three-dimensional design window, the front and rear pieces of the garment are placed respectively, and the cut pieces are fitted to the human body using the display arrangement point tool. And then use the sewing thread and free sewing tools in 2D before and after the design of clothing window, shoulder seam, suture in areas such as the side seam, collar, sleeves, carefully check any stitching

error, determine and correct the 3D window after according to synchronous tools, after hardening will dress whole blue clamp-resist dyeing dress to wear on the mannequin, then it will lift its hardening clothing as a whole.

#### 4.4. Blue clamp-resist dyeing fabric design

The fabric simulation of virtual clothing design mainly simulates the texture and drape of the required fabric in the virtual state. The front piece, back piece, sleeve and other parts of this garment are made of garment fabrics. Set the corresponding parameters of these cuts in the garment virtual design software, add fabric types in the fabric attribute bar, and use the mapping tool to add the effect of blue clamp-resist dyeing pattern to increase the overall value of the garment. Before setting, you need to use Photoshop tool to cut out the required image and save it as PNG format. In the process of setting texture, select the original processed image and adjust the position and Angle effectively through the texture adjustment tool.

#### 4.5. Virtual fitting display

After the virtual clothing is made, it needs to be tested for fit, which is similar to the real sample clothing trying on, checking the rationality of the clothing pattern and correcting the pattern [7]. In the virtual environment, the pressure detection between the human body and the clothing is used to simulate the fitting degree of the human body and the clothing. The virtual clothing design software comes with the snapshot export function. After the production of the virtual clothing, the final effect can be quickly viewed from multiple angles, and the problems between various parts can be detected, so as to facilitate its adjustment. You can also use the rendering tool to render and output high-quality images, as shown in Figure 1.



Figure 1: 3D virtual display of blue clamp-resist dyeing clothing

### 5. Conclusions

The combination of Blue clamp-resist dyeing and 3D clothing virtual technology can help improve the existing promotion and display mode of Blue clamp-resist dyeing and return to people

themselves. It integrates virtual reality and augmented reality technology, with the characteristics of combination of virtuality and reality, imagination and enjoyment, to some extent it can solve the dilemma of Blue clamp-resist dyeing and help improve the existing promotion and display mode. In the fusion and collision of Blue clamp-resist dyeing and modern virtual design and display technology, it opens a window of new life for traditional Blue clamp-resist dyeing, which provides a research path of the integration of science and practice for Wenzhou Blue clamp-resist dyeing intangible cultural heritage virtual living display. At the same time, it makes a design of the development process and formulates standards for enterprises of advanced customization virtual design. Therefore, the efficiency of fashion design and development is greatly improved, it achieves a reality of the collaborative innovation design and development in the era of Internet+.

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