

# The Application of Digital Printing Technology in Modern Silk Garments

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**Abstract:** Mainly from the perspectives of technology, design and application, this paper studied how to take use of digital printing technology to make silk garments feature more modern aesthetic value, and expand the application space of silk fabrics in modern clothing. Through the investigation of the whole production process currently, this paper gave a summary of the status quo and existing problems of digital positioning printing on cutting pieces, and put forward an optimization of the overall design and production process. A simulating practical production process in CAD software is applied to verify the optimized process.

It is considered that the rise of digital printing technology pulls the direction of fashion design toward the Eastern from the Western system, the former one focusing on decorative patterns and the later on perspective and structure. The aim of this paper is to promote new thinking and develop silk fabrics and silk clothing, which have more modern aesthetic value, through the investigation of the application of digital printing technology in modern silk clothing, so as to make silk the symbol of Chinese civilization – recover its vitality.

## Introduction

Digital printing is a new technology that combines innovation design with high technology, a break through in dyeing and finishing field. This technology is widely used in all kinds of graphic design, especially for textile printing design. And the application of digital printing in silk garments occupies an important position among these. Therefore a number of brands that specialized in digital printing for their design elements and selling points is booming both at home and abroad. For example, Mary Katrantzou abroad, Chinese local brand Chictopia etc. It should be said that the digital printing technology in the application of silk garment has become increasingly mature, but there still exists some problems: time consuming and labor consuming caused by the artificial positioning printing on cutting pieces; material consuming problem due to the lack of the procedure of material Layout; high defective rate because of the artificial uncontrollable factors in positioning printing procedure.

Through investigation and study, combining with the clothing CAD technology, this paper put forward the concept of integrated consideration of style design, structure design and the overall development flow when designers design the digital pattern and printing, and proposed a digital printing production process optimization scheme on silk garment, especially for the improment of cutting pieces positioning digital printing process, the optimization could reduce silk garment defective rate and cost and make the digital printed silk clothing more competitive in the market.

## **1. Digital printing and silk garments**

### **1.1 The technical features**

Digital printing technology mainly relies on computer aided design (CAD) technology, computer aided manufacturing technology (CAM) and computer network technology, and these three technologies enable the entire producing technique and equipment digital, realize digitalization of the overall manufacturing process. Designers with complex picture layer processing ability of computer software such as CorelDraw, adobe Photoshop, Painter design a personalized digital patterns and printings, and then print it directly on the fabric through the digital printing machine. Digital printing technology eliminates the working procedures in traditional printing like color separation, the tracing draft, plate making, screen and colors matching. Pattern and printing can be printed after the input of digital image procedure. Its production is not affected by the quantity and length limit. Thus, this digitalization greatly improves the accuracy grade of printing and color changes, the accuracy grade can reach 2880 dpi resolution highest and the numbers of colors can be the tens of millions of species. Therefore it can produce fabric with complex printed pattern and rich color changes, the digital printing production of fabrics greatly expand the artistic expression, and also make the printing design become a more and more important design element in clothing design and selling point in marketing.

In addition, digital printing technology does not need the process of pattern making, and produces fabric quickly, besides, the production lot size can be small to several hundred meters or even dozens of meters, meanwhile the current clothing consumption market is more and more in the quest for diversity and personality, fashion trend of transmission speed is faster and faster, popularity-life cycle is more and more popular. Digital printing technology from the aspects of design, production, sales, all fits with the current clothing market.

### **1.2 Advantages of applying digital printing on silk garments**

In terms of the characteristics of silk itself, silk fiber is fine and smooth, displaying color well in high color saturation during printing and dyeing process, the imagine adopting digital printing technology is in high image accuracy, the color change is exquisite and rich, silk fabric is fit for performing of digital printing and can realize its design intent perfectly.

In terms of the characteristics of silk garment, due to the high silk fabric price, the clothing style type is more suitable for personalized dress and haute couture, besides, the silk garments itself have inherent defects (easy to wrinkle. easy to snag. the technological requirement is high. the garment wash protect requires higher etc.). Therefore, silk garment production batch is generally not high, but have higher requirements on the degree of exquisiteness and personalized creative expression, all these features of silk garments are in conformity with the characteristics of digital printing technology.

From the perspective of clothing costs, the defective rate should be reduced as far as possible in the process of printing and dyeing to lower the cost due to silk fabrics price is high. Meanwhile digital printing technology is hardly affected by material and human factors, and the effect and quality of the printing is quite stable, the color and effect of 1000 pieces are almost identical with one piece. In a word, defective rate of digital printing applied on silk is very low.

In brief, modern silk garments can take the significant advantage of digital printing technology and maximum the merits, which are different from traditional printing, show personalized innovative design of modern clothing.

### **1.3 Digital printing design**

In the process of practical production, garment digital printing design generally divided into two kinds: (1) the whole piece of fabric digital printing design, regardless of the cuttings of clothing shape. (2) positioning digital printing design considering the garment shape of cutting pieces.

#### **1.3.1 Printing design on the whole piece of fabric**

Due to digital printing technology breaks through limitation of the traditional textile printing and dyeing, it prints in gradient color with high accuracy on the transition nature, clear, and color reached. Pattern and printing designer can make full play to imagination, it greatly enriches the forms of pattern design and the creation textile categories and broaden people's visual field, produces a new kind of design style, the realization of personalized fabric design and modern fashionable style caters to the aesthetic needs of consumers.

Taken together, the digital printing not only shows the traditional printing design effect easily but also creates new styles of design. These styles can be divided into the following several types:

(1) Representational motifs - the natural scenery, cultural landscape, people, animals and birds, forest trees, flowers and plants pattern sprayed on the fabric in the form of images.

(2) Abstract pattern, through computer aided design technology, the combination of all kinds of abstract graphic elements creates dynamic lighting effect, the texture effect, psychedelic effect and other digital designs.

(3) Three-dimensional effect design, computer aided design software changes and restricts the shape to express the design of visual depth, and produces virtual space to simulate the three-dimensional effect in the two-dimensional space.

#### **1.3.2 Positioning printing design**

This kind of printing design takes the appearance of the clothing style and garment structure into consideration (as shown in figure.4 and figure.5). It is preferable for the expression of digital printing technology in the clothing design innovation application. And it requires designers think clothing design and production technology in advance in the process of digital printing design, higher required for designer's comprehensive ability. Now digital direct printing method is relatively popular in silk garment cutting piece positioning printing design. This was the key discussion in this paper.

## **2. Problems existing in current production process**

### **2.1 The current application status**

Applications of positioning digital printing on cutting pieces considered the visual effect of different parts of the human body. This increases the manifestation of costume design, extremely rich interestingness and visual impact; therefore printing design in the clothing of different pieces can show the advantage of digital printing completely.

Clothing brands take digital printing as characteristics apply cutting pieces positioning digital printing on their clothing design is a large amount no matter at home and abroad.

### **2.2 Problems that exist in the application**

Through the investigation and study of the current practical production process. The silk garment cutting pieces positioning printing production process is as follows shown in the fig.1 below:

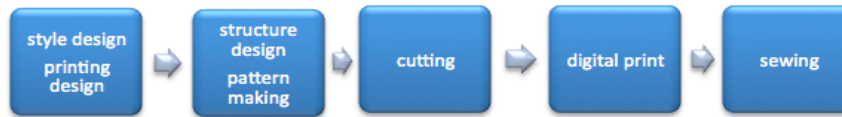


Fig.1: The current practical production process

First of this process, it is style design and printing design, then carry on the structure design and pattern making, the next procedure is fabric cutting, then digital printing, sewing goes finally. The main problems of the process in the production of silk garments is as follows:

(1) Time consuming and labor consuming: the procedure of artificial positioning printing on the cutting pieces, not only make the production speed slow, but also difficult in aiming at the accurate position on the piece of fabric, all these creat time and labor consuming problems for subsequent sewing procedure.

(2) Material consuming: due to the lack of material layout procedure in the production process, expensive silk fabrics can not be used as far as possible. And, the errors taken by the artificial position printing may cause the waste of fabric. All these result in a problem of material consuming.

(3) High defective rate: during the garment production process, printing on cutting pieces directly may cause mistakes because of artificial uncontrollable factors. And the inaccurate printing position brings difficulties in the procedure of sewing. Consequently, it leads a high defective rate.

### 2.3 The optimized production process

To solve the problem above, this paper put forward a process optimization that it considered a overall design concept which incorporate printing design. style design and pattern making. Printing design should be taken into account when pattern making and be applied on the cutting pieces with the right printing position through CAD software. Then goes with the material layout process in the condition that the printing has been put on the cutting pieces. Cutting pieces with printing on it are arranged on the material layout picture through software in a material-saving way. The digital information finally put in the digital printing machine is the picture with cutting pieces in reasonable layout. And the product come out from digital printing machine is a complete fabric that cutting pieces with printing on it.

The optimized production process greatly saves the amount of fabric and printing ink, and is convenient for subsequent cutting process, reducing the pattern error and the dosage of the silk fabrics. and it reduces the whole cost of production of silk garments. Thus, clothing cutting positioning digital printing optimization process of silk garment is as follows (as shown in fig.2):

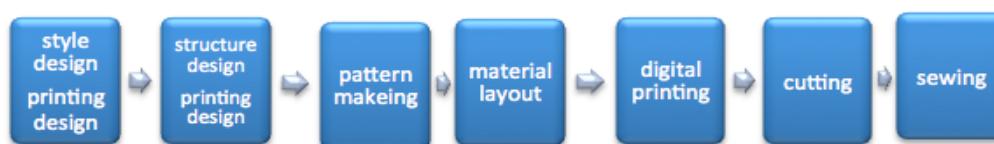


Fig.2 The optimized process

### 3. Example of cutting pieces positioning digital printing silk

According the production optimization proposed in the second section, this section puts forward the validation of this new process by simulating the overall production process of the cutting pieces positioned digitally printing silk dress, meanwhile, and a further research and exploration on the issue of this paper.

### 3.1 The simulative production process

#### (1) Style design and printing design



Fig.3: Style design

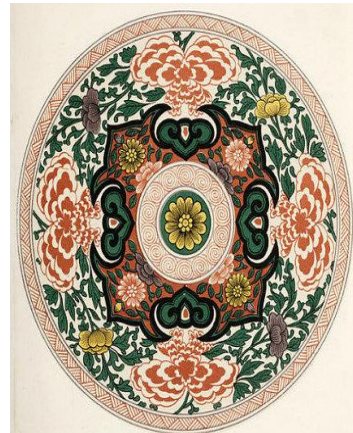


Fig.4: Printing design

#### (2) pattern making and printing design

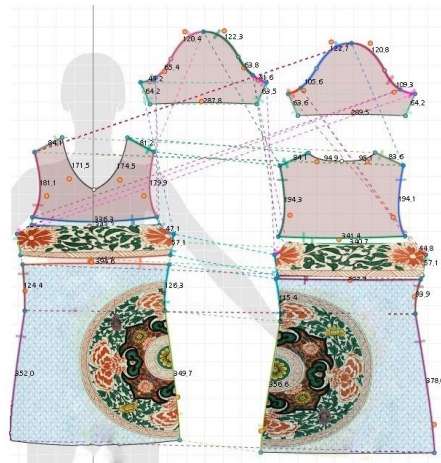


Fig.5: Pattern making and printing design

#### (3) material layout picture

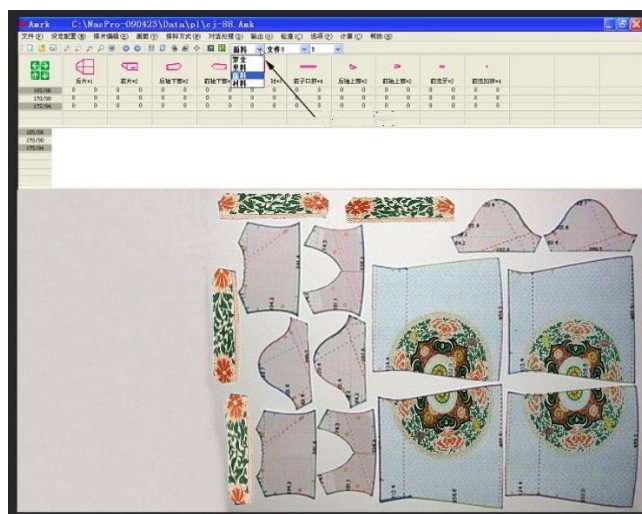


Fig.6: Material Layout picture

## (4) Three-dimensional simulation of the fitting



Fig.7: Three-dimensional simulation of the fitting

Fig.3 to 7 above showed a simulation of a practical design and production process of a silk dress according to the optimized process. the optimized process its advantage lies in the following points : The digital images are complete material layout picture with positioning printing on its cutting pieces in accordance with the requirements of designers and pattern maker when they are delivered to printing factory. Fabric printed in this way can be delivered to cutting and sewing procedure directly. Workers sew the pieces after cutting them down according to the cutting line printed on the fabric; Because of the procedure of material Layout brought into the whole process reasonably, problems that existed in digital printing procedure, cutting and sewing procedure will be reduced greatly, and the cost of silk fabrics is reduced highly. All this optimization of the process facilitates the industrialization production of digital printing silk garment.

### 3.2 Conclusions

Aiming at the problems of high time consumption, high material consumption and high defective rate in the cutting pieces digital positioning printing production process on the current domestic market, a new production process optimization is proposed in this paper. Its core viewpoints are as the followings:

(1) Through the rearrangement of the production process and incorporation of the material Layout procedure, the difficulty of printing and sewing procedures is cut down. Thus, defective rate and cost can be lower.

(2) This paper put forward the concept of integrated design in the process of design and production, that is, a comprehensive consideration of style design, structure design and the overall development flow when designers design the digital pattern and printing.

(3) Apply computer graphics design technology in developing digital printing and use advanced CAD technology to realize the position of pattern on cutting pieces and material Layout to improve production efficiency and the quality of silk clothing products. Design of cutting piece and positioning, and scientific layout, improve production efficiency and improve the quality of silk clothing products.

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