

## Designing and Sublimation Printing of the Polyester Fabrics Using Hyper-Realism Style

Maryam Darvishi<sup>a</sup>, Ali Nazari<sup>b\*</sup>, Abolfazl Davodi Roknabadi<sup>b</sup>

<sup>a</sup>Department of Art and Architecture, Yazd Branch, Islamic Azad University, Yazd, Iran

<sup>b</sup>Associate Professor at Department of Art and Architecture, Yazd Branch, Islamic Azad University, Yazd, Iran

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### Abstract

Hyper-realism style is considered as attractive and meaningful concepts regarding its unique and real advantages. One of the fields that has a manifestation capacity of hyper-realism designs and yet has attracted less attention is textile. This research has focused on designing, painting and printing images on polyester fabrics by using hyper-realism style. It has used polyester fabric as a suitable substrate to print derived designs from hyper-realism designs. It has also used art elements and images to integrate two or more photos. Creative and various designs were printed by designing software such as Photoshop based on realism and concepts of mentioned art style. Hyper-realism designs were treated on fabrics by batik painting and sublimation printing, variously. Regarding the attractive and innovative obtained results, polyester fabric can be used for fields such as clothes, panel and bedside lamp designing. As such, a diverse and different vision will be provided through the mentioned applications. It shows a high potential of derived designs from hyper-realism style and its generalization in different life situations. The results of the research showed that hyper-realism designs were created on polyester fabrics by using common methods such as batik painting and sublimation printing.

*Keywords:* Batik; Hyper-Realism; Painting; Polyester Fabric; Printing; Sublimation

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### 1. Introduction

Polyester fibers and fabrics are widely used as artificial fibers and a substitute for cotton and natural fibers. Polyester fibers are considered as most important synthetic polymer fibers all over the world due to its highly desirable properties such as elasticity, high resistance against chemical

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\* Corresponding author. Tel: +98-9132742611.

E-mail address: [a.nazari@iauyazd.ac.ir](mailto:a.nazari@iauyazd.ac.ir).

materials, wrinkle and rapid drying. Today, these fibers are widely used in clothing and textile industry. The polyester fibers have only 0.4% moisture absorption in the standard conditions, which is considered as hydrophobic with 7% moisture content compared to cotton fibers (Moridi-Mahdieh et al., 2018; Abou-Nassif, 2012). The most important advantages of fibers and textiles made from polyester includes high flexibility, desirable elasticity, high strength, high abrasion resistance, anti-wrinkle, high suitable dimensional and light stability and high resistance to many compounds such as acids (Hoghoghifard, Mokhtari, & Dehghani, 2016; Karthik, Senthilkumar, & Murugan, 2016). Hyper-realism style has high potential in producing and supplying variety of attractive designs for different situations and people with different and various tastes. Diverse backgrounds exists that have the potential to emerge and provide artistic style, including widely used and high influential textile production area. A wide range of people can be influenced through attractiveness of this style. The aim of hyper-realism style has a different perspective and deeper impact on audience by representing the realities of surrounding. Indeed, the hyper-realism style is important which indicates an image or design attracts attention not due to the type of subject, but also due to the way in which the subject is represented (Takahata et al., 2014).

In recent studies, the application of nanoparticles on cotton (Asgharian-Dastenaie, Nazari, & Derakhshan, 2017), wool (Hosseinkhani et al., 2017), silk (Nadiger & Shukla, 2016), nylon (Teli & Annaldewar, 2017), polyester (Harifi & Montazer, 2013), acrylic (Nazari & Montazer, 2014), and viscose fabric (Karthikeyan, Vijayalakshmi, & Vignesh, 2016) has been developed because of special properties of this compounds, such as good chemical stability, nontoxic, washing stability, non-corrosion to light, and availability for surface modifications of textiles. But few studies have been done to create artistic designs on textile fabrics (Jalili, Nazari, & Derakhshan, 2016). The purpose of this research was to design and study the possibility of painting and printing on polyester fabric using hyper-realism style in order to create attractive contemplative images with different perspective for consumer by creating integrated images by using hyper-realism style, psychology science and art techniques.

## **2. Materials and Methods**

### **2.1. Fabric Selection**

In this research, three types of fabrics was used which includes cotton fabric, polyester-cotton fabric and 100% polyester fabric and two batik painting and sublimation printing method were implemented to create the derived hyper-realism style designs on these fabrics. In batik painting, the design was transferred on fabric. In sublimation printing, inspired hyper-realism images were designed by the software and transferred on fabric by printer.

### **2.2. Sublimation Printing**

Generally, sublimation printing is a method to convert images to printable images. In sublimation printing, the device receives the design from system files intelligently, and printed transparently. Sublimation printing usually involves a small number of professional printing by desktop publishing and other resources which is done by laser printers and large format printers or inkjet printers. Sublimation printing is expensive for printing each page than traditional ones such as offset, but this high price is usually compensated by saving other costs such as the cost of preparing printing plates. Sublimation printing allows fast printing at low demand and allows the change of layout or design and its contents in each printed sheet. Sublimation printing is

comparable with offset printing and even it is outstripping, in terms of human resource saving, growing capacity of sublimation printing machines to enhance and improve the printing quality, decreasing printing costs, decreasing total cost of each printed sheet and increase the number of prints.

In this research, sublimation printing has been used to print designs on fabric. The desired design has been printed on surface directly from computer, and this printer eliminates the speed and cost constrains of production. Fig 1 shows the sublimation printing printer, Fig 2 shows the main colors of the printer, Fig 3 shows the 3D device or sublimation printing and Fig 4 shows the used printing press on the printed design.



**Fig 1** Sublimation printing printer



**Fig 2** Main colors of sublimation printing printer



**Fig 3** 3D device or sublimation printing



**Fig 4** Press machine

### 2.3. Batik Painting

Materials and devices required for batik painting includes a wooden frame (Fig 5), polyester fabric (Fig 6), gutta outliner paste (Fig 7), acrylic colors (Fig 8), painting design, brush and pallet. In the initial stage, a wooden frame is made, then the polyester fabric is fixed on this frame so that the fabric looks like a paper sheet. This fabric should be placed on the frame so that when it is hit, it sounds like a drum and it must be completely flat. After these steps, the painted design is fixed from back of the fabric by adhesive and then transferred on the fabric by cutter. When the design has been transferred completely on the fabric, the design is kept to dry for few hours and then the colors are selected to be painted on the fabric.



**Fig 5** Wooden frame for batik painting



**Fig 6** Covered frame by polyester fabric



**Fig 7** Gutta outliner paste



**Fig 8** Fabric colors for batik painting



## 2.4. Processing Different Fabrics

The inkjet printer was used to print designs on cotton fabric. Design of hyper-realism style was designed by system and then printing order was given to the printer. In Fig 9, printed design on cotton (Fig 9-a) and polyester-cotton (Fig 9-b) fabric with sublimation printing are shown.



**Fig 9** Sublimation printing on (a) cotton and (b) polyester-cotton fabric

The printed images cannot be evaluated immediately after printing; the samples must be stabilized in drying to coloration step. As a result, the color of printed design will become apparent and change in color. Therefore, the colors used for printing on the fabric will become real after stabilization operation, because the colors are fixed on the fabric after it dries leading to more transparency.

Two batik painting and sublimation printing methods was used to treat of polyester fabrics. It was used file in system and inkjet printer in sublimation printing methods. Hyper-realism style was designed and the printing command was given to the printer. Fig 10-a, shows the used polyester fabric and Fig 10-b shows the printed hyper-realism style design on polyester fabric using sublimation printing.



**Fig 10** Polyester fabrics (a) control and (b) printed using sublimation printing

For batik painting on polyester fabric (Fig 11), a wooden frame has been made with the polyester fabric fixed on this frame like a paper sheet to be flat. After this steps, the desired design was fixed from back of polyester fabric and transferred on the fabric by outliner paste. When the entire design was transferred on fabric, it was kept to dry for two hours and then colors were selected to be painted on the fabric.



**Fig 11** Batik painting on polyester fabric

### **3. Result and Discussion**

The printing on the cotton fabric was weak and not clear in way that it seems printing nozzle did not print the entire fabric surface properly; parts of the tested design were not printed and the printing lines was clearly seen. A sample of printed designs on this type of fabric was very pale at the first glance and this fabric cannot satisfy customers and audiences.

#### **3.1. Batik Painting and Sublimation Printing**

The painting and printing on polyester-cotton fabric, the printed design has higher quality than cotton fabric and it is clearer. But, still there are a number of fiber lines in the printed designs. The pigments are non-uniformly seen on the fabric surface which are bold in some areas and pale in some areas and it can reduce the quality of printing on polyester-cotton fabric. Since, the polyester is a synthetic fiber and there is no impurity in it, non-uniformity of the printing operation is less than cotton fabric (Fig 9).

### 3.2. Batik Painting and Sublimation Printing on Polyester Fabric

The printed sample on the polyester fabric has high degree of glare than the other printed samples. Colors are printed on this fabric uniformly and there is no non-uniformity on the surface of the fabric and printed parts. The appearance of the fabric is very beautiful which is softer than the previous samples with very high clarity. Printing paste is spread throughout the fabric uniformly and there is no bold and pale areas on the fabric surface. General comparison between different fabrics in this experiment, printed design on polyester fabric is more polished, attractive and transparent, the printed reas have distinct boundary lines and there is no non-uniformity. In this printing method, fabric fibers are entirely synthetic and these fibers are extremely resistant to wrinkle even when they are wet. The printed design on this type of fabric has high quality and transparency. There was no error in printing nozzle on this type of fiber. Fig 12, show the sublimation printing on the polyester fabric.



**Fig 12** Main printed design on polyester fabric using sublimation printing

Quality of sublimation printing on polyester fabric is more than the other two types of fabrics. Printing quality is not weak like cotton fabric and there are no fiber lines such as polyester-cotton fabric. Batik painting has high clarity, transparency and quality and it can be used for design using hyper-realism style (Fig 11). There are many advantages in printing on polyester fabric, one of which is less absorption of ink than other fabrics. These fabrics were made of more synthetic materials. Thus, printed designs seem more beautiful and attractive. Disadvantage of these type of fabrics is that they are not suitable to wear for long-time and they are used for short-time. Designing and printing of polyester fabrics are possible by using hyper-realism style. Hyper-realism style can be implemented through sublimation printing operation on polyester fabrics and the ability to transfer animal and plant designs is more than other designs using hyper-realism style.

### 3.3. Reason to Choose Hyper-Realism Style

Hyper-realism style is a style recently introduced in the fashion and design industry and has not had a great boom in the textile industry. This research has tried to open new window of artistic style to design fabric and clothes for consumers by combining two or more hyper-realism images and

creating an image that seems to show a combination of subject with more precision. At first glance, this style and its derived images makes audience in doubt, challenges her/him and provides different perspectives of an image. Printed and painted images of hyper-realism style on tested fabrics are shown in Fig 13 and 14, respectively.



**Fig 13** Sublimation printing by using hyper-realism style



**Fig 14** Batik painting by using hyper-realism style

#### 4. Conclusion

Designing and integrating images of the face, human body and industrial objects can be effective by batik painting and sublimation printing on polyester fabrics and provide different aspects and perspectives of an image to the consumer and viewer. This study showed that 100% polyester fabric is more suitable for batik painting and sublimation printing. It is not possible to perform high quality printing on cotton and cotton-polyester fabrics and printed designs are seen opaque and turbid because of percentage of its cotton. Among the treated fabric samples, batik painting and sublimation printing on 100% polyester fabric for different purposes has highest quality.



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