Visual Analysis of Xerography Image Transfer on Textiles

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Abstract. The advances of technology consciously or not affect the realm of textile processing both structural and surface processing. A textile designer or artist should be able to utilize technology as a means of engineering exploration in order to generate a new and fresh visual idea that automatically will increase the aesthetic value of a work. In its development, image transfer became one of the techniques that is present in the realm of surface design textile as an implication of the effect of technological progress on the long history of textile processing. The image transfer technique enables a textile designer or artist to move an image from paper to another material by a particular method. In this study the authors intend to experiment with the use of image transfer techniques to transfer images created through xerography on a variety of textile materials with different surface and structural characteristics. So as the result this research produce a data analysis of technical as well as visual aspect from xerography image transfer technique which can be used as material of learning development and a comprehensive comparative study among the many surface design textile techniques.

Keywords: surface design textile, image transfer, xerography

1 Introduction

Textiles can be everything in the form of sheets of cloth that use braided threads or other fibers in the process of their creation. The processing or fabrication of textiles itself is divided into two main category, the surface textile design and structure textile design with different concentrations of each category. In structure textile designs are made simultaneously with the process of making or composing textile materials, while in surface textile designs are made on the surface after the textiles are produced. In other words, in structure textile design, the design or fabrication process is done on fabric construction, while in surface textile design, the design and fabrication process is done on the surface of the finished fabric. Both processes are intended with the same goal that is adding aesthetic value to the textile or fabric that are produced.

As technology advances, various techniques in the field of textile surface design growing up following the current use of technology to optimize the results obtained. In its development, image transfer become one of the many techniques in the field of textile surface design. Image transfer is the technique of transferring images from paper to other media such

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as wood, glass, clay, and cloth in order to produce the patterns that are planned [1]. Generally, there are three categories of image transfer based on image shedding techniques, the first is using glue and a medium gel which has a function as a paste to take ink from the paper with the image on it so that sticks to the transfer object. The second category is using heat such as an iron or hot-press, and the third category using solvent liquid.

The discovery of xerography machines or more popularly known as Chester Carlson's photo copier in 1938 was giving a contribution significantly to the printing realms. The xerography machine is used to produce high-quality text and graphic images on paper that take shorter time compared to other machine printing techniques. In the world of art and design in the 1970s when xerography machines became more accessible, artists such as Andy Warhol, Ginny Lloyd and Ian Burn began exploring their artwork by using these machines, until finally practicing art using xerography technology was known with Xerox Art.

The exploration of surface textile design by the author in this study will apply the results of images created through xerography techniques to be applied to various transfer method. As the initial assumption of the author, images that are printed using xerography machines can move to fabric material because the printing ink on the xerography machine uses laser toner ink which is easily dissolved by solvent. This study aims to analyze the visual and technical aspects of the xerography image transfer technique when applied to various textile materials with different surface and structural characteristics.

2 Literature Review

2.1 Image Transfer

Image transfer is a technique of moving images from paper onto the surface of cloth, wood, glass, ceramics or other media in order to produce specific visual effects or patterns. The images to be transferred are generally printed from digital inkjet or laser jet printing machines as well as conventional printing machines such as offset printing on certain paper according to the printing machine. The process of transferring images that are worked manually by various methods according to the material that are used will produce a specific 'imperfect' visual effect on the surface of the transfer object.

Image transfer can also be classified into the surface design textile category because one of the media that can be processed to increase the aesthetic value is the fabric surface. On the surface of the fabric, this image transfer technique will have different results from surface design techniques such as digital print and screen printing, the finished result of this technique will add its own attraction by exploring the methods and materials that are used in the image transfer technique process [1]. Based on the material used as an ingredient to help the process of transferring images on the transfer object media, there are three main methods in the application process of this technique, including:

- **Glue**
  Is a special adhesive material that is used to transfer ink from transfer paper to the transfer object media. This method is done by applying special glue to the surface of the transfer object media which will be attached to the image on transfer paper. This glue will hold the ink from transfer paper to stick to the surface of the transfer object media. To help transfer the image, usually done the pressing process using rollers or other scrubbing tools.

- **Heat**
  Is a method of transferring images by using heat power generated by a hot press or iron. In the process of using this method, the image used is the result of a digital printing
process on special transfer paper so that the ink will move on the surface of the transfer object media when the back of the paper is heated.

- **Solvent**
  This method uses clear liquid that has a distinctive smell called solvent. Usually this liquid is used as a screen cleaning liquid known as M3. Solvent is used by apply this liquid to the back of the illustrated paper and then use the scrubbing process to help move the image on the transfer object media [2].

  Generally, the image used in this image transfer technique comes from the printed digital print machine on special transfer paper. Unlike with plain paper, the special transfer paper has the ability to release the ink absorbed when receiving certain actions such as heating, pressing or rubbing. Different from a xerography machine or more commonly known as a photocopier, the ink will be more easily released when receiving a scrubbing action before being coated with solvent liquid even though the image is printed on plain paper. Image transfer techniques that are using images derived from printed xerography machines are still rarely used, especially in textile materials, whereas visual potential that are created has a unique character compared to other image transfer techniques.

### 2.2 Xerography

Xerography is one of the printing techniques commonly used on paper media by using electrostatic power on a light-sensitive photo receptor to transfer toner particles to the surface of the paper in the form of an image or text image. Xerography technology is used in most photocopiers, laser printers and LEDs. The use of a copier as a printing press began to be easily discovered in the 1960s. Some artists in America use the xerography process in photocopying machines as an artistic tool, so xerography is known by the term xerox art which shows the creation of works of art using photocopiers as a method of image transfer.

Some artists use this xerography technique in several ways to convert copies into new forms, including:

- **Copy motion**, to create an effect by moving the image on the plate during the scanning process.
- **Direct imaging**, to copying items affixed directly into the plate.
- **Still life collage**, to make image variations with items placed on plate.

  Xerography has been a creative medium for artists and activists over the past few decades in the twentieth century. In the 1970s and 1990s, in the center of New York there were several works to create movement in art and democracy during the political period using xerography technology. Like some works of art created by punkster, poster makers, zineters, and activists, as well as artists who spread a round of AIDS activism that simultaneously introduced photocopying machines as DIY aesthetics to international markets [3].
2.3 Art Elements

The art elements are the basic visual building blocks that can be observed or experienced in an artwork. It’s used to compose or order the way to see an artwork and also to convey ideas through their associations. In this research, the art elements theory are used to analyze the transfer results of xerography image transfer technique into textiles. There are several art elements,

- Line, a single dimension form, joining two points. It has length and direction. Every line has a thickness, rhythm, and direction. By varying width and direction, it can create movement or weight and suggest emotions.

- Shape, an area contained within an implied line, or defined by a change in colour or tone. They have two dimensions: width and breadth. They can be free-form and organic (asymmetrical) or geometric in nature (symmetrical).

- Colour, generated by light reflecting off a surface and describes our experience of this action. Colour is a visual sensation and can be represented realistically or artists can deliberately alter colour for emotional or subliminal effects. Hue, value and intensity are the main characteristics of colour.

- Tone, are black, white and grey and can be described as a range in terms of key or value. Tone can increase the sense of reality or the three-dimensional, or can add a sense of drama if tonal contrast is used.

- Texture, the surface quality, from smooth to rough, that can either be felt or observed (literal or implied). Texture can be simulated or actual. Application of paint with a dry brush suggests roughness while heavy application of paint mixed with impasto can create raised ridges of actual texture. [5]

3 Methods

In this research the author refers to qualitative-based methods on analysis through literature studies, observations and experiments related to the research. Literature studies were carried out on several sources of book that discuss the object of research which are “Image Transfer Workshop – Mixed Media Technique for Successful Transfer” and “Surface Treatment Workshop, Explore 45 Mixed Media Technique” to obtain technical data on the image transfer technique that used on this research. In addition, the authors conducted a study from
“Adjusted Margin: Xerography, Art and Activism in The Late Twentieth Century” to obtain data on the potential use of xerography as an aesthetic element in textile materials. Direct observations were made on several works of art that used xerography image transfer technique to observe the potential for their application to various textile materials that would be used in the experimentation process. Experiment process carried out using various textile materials such as cotton, canvas, denim, genuine and synthetic leather as a tested variables. The final result is a visual analysis of the research object based on visual elements in the series of experimentation processes that have been made by author.

4 Result and Discussion

4.1 Experimentation Process

Experimentation is a stage that were made after collecting data through literature studies both from books and journals conducted by previous researchers. At this stage, author conducts experiments related to the research both technically and materially. Based on the object that being tested, the author develops the image transfer method using images produced by xerography technique which is the products of printing technology that can be found in the photocopiers [4].

Textile materials used in the experimentation process include cotton, denim, canvas, genuine leather and synthetic leather. The selection of textile materials is based on differences in the visual characteristics of each surface, so that it is expected to obtain a varied print on each material used. In process of transferring the image from paper to the surface of transfer object, a chemical liquid is needed which is it functions to shed toner ink on the paper. In this experiment author uses two chemical liquids, solvents and acetone, to compare which liquids provide optimal printing results for each textile material.

The work steps of the image printing process on textile materials are explained in the flow chart below:

Fig. 2. Process flow of xerography image transfer technique [4].
### 4.2 Transfer Result Analysis

**Table 1. Visual analysis table**

<table>
<thead>
<tr>
<th>No</th>
<th>Transfer Results</th>
<th>Materials</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><img src="image1.jpg" alt="Cotton Solvent" /></td>
<td>Cotton Solvent</td>
<td>The picture of the transfer is clearly visible in solid black, but there are few fields that are not printed perfectly. The surface texture of cotton material has a tightly woven thread structure so that the resulting image remains sharp. Technically there is no change in the fabric's surface caused by the use of solvents.</td>
</tr>
<tr>
<td>2.</td>
<td><img src="image2.jpg" alt="Denim Solvent" /></td>
<td>Denim Solvent</td>
<td>The transfer image is clearly black but not thick, and there are few fields that are not printed perfectly. The surface texture of denim material has a diagonal thread braid structure with different depths so that the resulting image area is not perfectly printed. Technically there is no change in the fabric's surface caused by the use of solvents.</td>
</tr>
<tr>
<td>3.</td>
<td><img src="image3.jpg" alt="Canvas Solvent" /></td>
<td>Canvas Solvent</td>
<td>The transferred image looks black but not concentrated, and there is a part of the field that is not perfectly printed. The surface texture of the canvas material has a braided thread braid structure and protruding feed so that the resulting image is not perfectly printed. Technically there is no change in the fabric's surface caused by the use of solvents.</td>
</tr>
<tr>
<td>4.</td>
<td><img src="image4.jpg" alt="Genuine leather Solvent" /></td>
<td>Genuine leather Solvent</td>
<td>Transfer images are less visible and tend to fade. The texture of the surface of the genuine leather material tends to be smooth but the transfer results are faint. Technically there is no change in the fabric's surface caused by the use of acetone.</td>
</tr>
<tr>
<td>5.</td>
<td><img src="image5.jpg" alt="Synthetic Leather Aceton" /></td>
<td>Synthetic Leather Aceton</td>
<td>The transferred image looks solid black and the image shape is near perfect. The texture of the synthetic leather surface which tends to be smooth makes almost the whole picture printed well. Technically there is no change in the fabric’s surface caused by the use of acetone.</td>
</tr>
</tbody>
</table>

The analysis is based on visual elements such as shapes, colors and textures that are printed by the xerography image transfer technique on the textile material tested, there are cotton,
denim, canvas, genuine and synthetic leather. The visual aspects, which are shape, color, and texture will be analyzed in the transfer results of the technique. The technical aspect becomes one of the components tested related to its influence on the fabric's surface in the use of solvent and acetone liquids (see table 1).

5 Conclusion

The images produced by xerography techniques have their own characteristics, besides in terms of colours that are generally produced in black, the effect of 'imperfections' of the print results is one of the visual elements that have a potential to be applied to various mediums. In order to apply it onto the textile materials, the image transfer method is one way to moving the xerography image onto the fabric surface. The steps taken are by applying a solvent or acetone chemical liquid on the back of the illustrated paper printed by photocopiers and then doing the rubbing process using a tool that has a hard, slippery and easily grasped character such as a bottle. The process of applying solvent or acetone on paper is intended to shed the toner ink used by photocopiers, so that the image on the paper will be transferred onto the surface of the textile material.

These are the results of analysis of visual and technical aspects related to the xerography image transfer process on textiles:

<table>
<thead>
<tr>
<th>Textile Materials</th>
<th>Visual Aspect</th>
<th>Technical Aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clear Shape</td>
<td>Solid Colour</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>S</td>
</tr>
<tr>
<td>Cotton</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Canvas</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Denim</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Genuine leather</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Synthetic leather</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

*A = transfer using Aceton  
S = transfer using Solvent

The results of the study, from the five textile materials tested which are cotton, denim, canvas, genuine leather and synthetic leather, in terms of the shapes produced in cotton, denim, canvas using solvents and synthetic leather using acetone can produce a clear image silhouette even though on canvas and denim material there are parts that are not perfectly printed. However, the synthetic leather material when using solvent, a silhouette of image cannot be printed properly and tends to be vague. In terms of colour, in cotton material with the use of solvent and in synthetic leather materials using acetone, the black colour results is more concentrated than other materials. In terms of texture, prints on denim and canvas materials using solvent liquid are greatly affected by the surface’s texture of the material, so the material characteristics are still very clearly visible. Finally, in the use of solvent and acetone liquid in textile materials, the use of solvents in genuine and synthetic leather material causes damage to the surface but it’s not found in other materials. It will be optimal when transfer the image into genuine and synthetic leather by using acetone.

Based on the results of testing at the research experimental stage, some commonly used textile materials such as cotton, canvas and denim can optimally receive images derived from xerography based image using solvent transfer liquid. While in genuine and synthetic leather, acetone is the optimal one. In addition to the five textile materials tested, there are still many other types of textile materials with their own characteristics which have a potential to be
used as transfer objects by using xerography image transfer technique. The authors hope that further study and exploration can continue to be carried out in subsequent studies.

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