CREATION OF SURFACE DESIGN MERGING VARIOUS TECHNIQUES

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ABSTRACT

To create multi-colored patterns and motifs on a textile substrate, many traditional techniques are available. Some of those, such as devore and batik, also generate a dimensional surface effect. Creation of colored patterns through hand-manipulation is labor intensive, but adds value through a unique design. Digital textile printing offers tremendous design possibilities due to nearly unlimited colors and repeat sizes, but it is not viable for a wide variety of fabric textures.

This paper reports a research driven creative process for developing textile pattern, color and texture by integrating traditional and digital surface design techniques. As a first step in the process, potential surface design techniques were surveyed via review of existing literature and creative work. Simultaneously, a source of inspiration was identified. Based on this creative inspiration, dye colors were chosen. The next step was exploration of techniques and sample generation. Numerous samples were created using different combinations of techniques. Two categories of techniques were explored; coloration and texture development. Color samples were created using resist dying and digital printing techniques. In resist dying, cloth is shaped by folding, crumpling, stitching, or plucking and twisting, secured by binding and knotting, then dyed to create interesting abstract patterns. Digitally printed samples with more representational imagery were also created. These were useful in finalizing the motif layout and for texture explorations. Devore and heat-set techniques were explored as ways to integrate texture into digitally printed fabrics. Variables such as fiber content and fabric thickness affect color output and impact results of devore and heat setting techniques. Consequently, explorations were carefully documented and the details of all processes recorded in a design journal. Finally, the detailed processes, as recorded in the design journal, provided the methodology for the successful integration of all selected techniques in a final garment design.

1. INTRODUCTION

To create multi-colored patterns and motifs on a textile substrate, many traditional techniques are available. For coloration, dyeing is the main technique which can develop color for textile products. It can be completed in different stages of textile production including fiber, yarn, or fabric stages. Textile designers and craftsmen have developed creative patterns as well as color using varied techniques including dyeing, printing, hand painting, resist dying, discharge and devore-burnout techniques (Campbell 2002). Digital technologies, such as ink jet textile printing, provide tremendous design possibilities in terms of color and patterns. To utilize each technique and achieve the desired the effect, it is important to understand the properties of textile substrates and explore how they react to color and pattern development. This paper reports a research driven creative process for developing textile pattern, color and texture by integrating traditional and digital surface design techniques in an end product.

2. DESIGN PROCESS

The general design process can be simplified as three fundamental activities; thinking,

looking and doing (Lauer 2000). The specific details of each activity, as described by Wong, included identification of the goal, interpretation of specifications, preliminary research, development of idea, eventual realization of the design, and final refinement (2001). In this research, the typical design process was modified to address the problem of developing a final product utilizing varied surface design techniques. Figure 1 diagrams the research process. Initial stages of reviewing the literature and creative work encompassed investigation of a wide range of coloration and texture development techniques, and led to the selection of the most appropriate techniques for addressing the defined problem. The identified techniques are divided into two categories focused on coloration and texture development. The techniques used for color development were resist dying and digital printing. Devore and shibori techniques were explored for texture development. Based on creative review, motif selection inspired color and pattern direction, and the choice of dye colors.

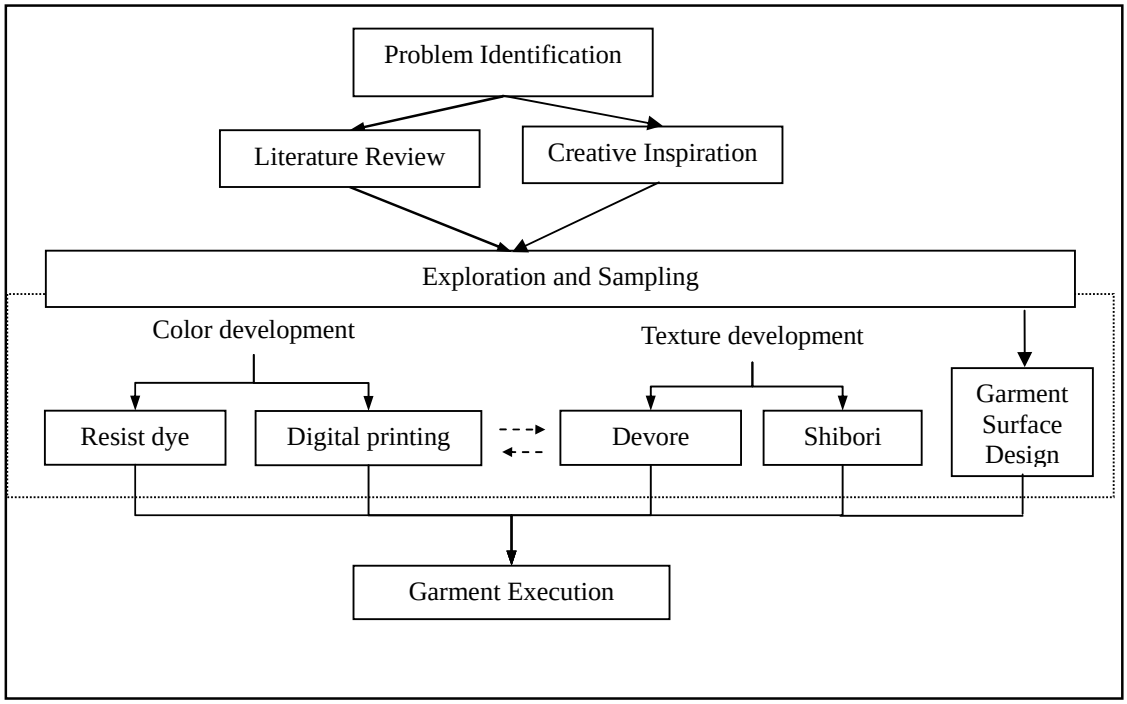


Figure 1: Design process diagram

2.1 Problem Identification and Creative Inspiration

This process focused on developing a final product through combining digital with traditional creative textile surface design techniques. The inspiration for this project was attendance at an in-depth workshop about textile applications for the Broadway theater given by a producer, a costume designer, a set designer and a lighting designer. During the workshop, the designers shared many amazingly complex theatrical costumes with intricate surface design effects. They demonstrated how the depth of color in a costume could be changed dramatically according to the different lighting effects. The workshop presenters also spoke about how they relied on hand painting techniques to provide the depth and subtlety of color in costumes. This project determined a process for creating a dimensional color surface and subtle textures using digital technologies. A realistic flower image was selected as a main motif for the textile surface design development.

2.1.1 Creative Inspiration: Color and Motif Development

The color palette was determined based on the flower motif. To create a warm and fresh feeling, yellow, a range of oranges, and light green were selected. Figure 2 shows the main color swatches.

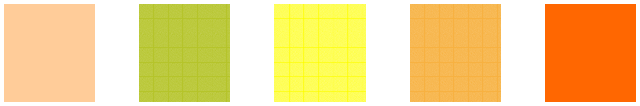


Figure 2: Color swatches

Figure 3 shows the flower motif used in this project. In terms of pattern development, a photographic and tonal image can be used for creating a design using Photoshop that is suitable for ink jet printing. Digital textile printing can be integrated with current design CAD systems and software, including Photoshop. This allowed the creation of photorealistic details.

Figure 3: Flower motif

2.1.2 Literature Review

Potential surface design techniques were investigated through study of existing literature and creative work. Four techniques were identified for further exploration.

2.1.2.1 Resist Technique

Resist dying creates shapes by folding, crumpling, stitching, or plucking and twisting fabric, securing it by binding and knotting (Brito 2003), and then dying. This technique creates random and abstract colored patterns.

2.2.1 Digital Textile Printing

Digital printing offers tremendous design possibilities due to characteristics including no limitation in color or repeat size, and the ability to print a photo quality image (Ujiie). Each designer must analyze and decide upon a digital printer that will allow flexibility in working with certain substrates, fiber contents and surface textures. The fabric's thickness, in terms of its ability to pass through the printer, and its traditional surface treatment must be compatible with the printing process, thus setting the boundaries on the final product. Combining digital printing with traditional surface design techniques

moves the medium beyond those boundaries.

2.2.2 Devore Technique

Devore is a technique which burns out the cellulose fiber in particular areas of a blended fabric (Lee 2000). This method is used to produce a pattern on cloth by printing or painting with a chemical paste that destroys one or more of the fibers in the fabric. To be applied successfully, it requires using cellulose and non-cellulose blended fabric such as silk and rayon or polyester and cotton. Burning out an area creates an interesting sheer surface effect (Singer & Syurou 2000).

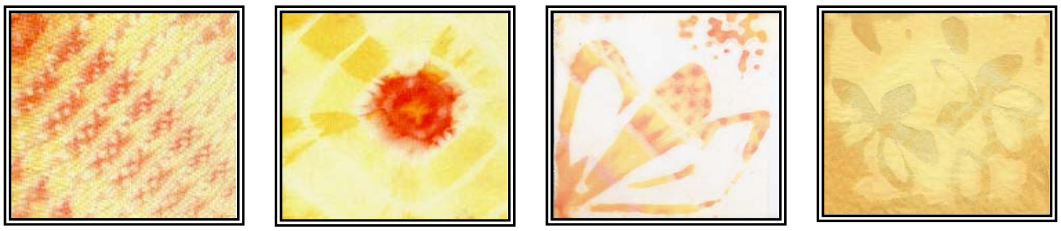
2.2.3 Shibori Technique

Color creation research yielded information about shibori techniques. Modern shibori techniques offer texture creation as well as creation of color and pattern. Arashi shibori results in delicate pleats by wrapping the fabric around the pole (Brito 2003; Wada 2002).

2.2 Exploration and Sampling

2.2.1 Surface Design Technique Sampling

The next step was exploration of the selected techniques and sample generation. Numerous samples were created using different combinations of techniques, as shown in the examples in Figure 4. Digitally printed samples with more representational imagery were also created. These were useful in finalizing the motif layout and for texture explorations.



(a) (b) (c) (d)

Figure 4: Resist dyeing samples (a) and (b), and devore samples (c) and (d)

2.2.2. Garment Design Selection

This process focused on the integration of textile surface design techniques and their application to an end product. In this case, a garment design with minimal structural detail was selected and a commercial dress pattern was used to execute the design.

2.3 Garment Execution

2.3.1 Material Selection

The dress was constructed with two layers: an outer layer with digitally printed flower

motifs and an inner layer with abstract random colored patterns. For the outer layer, the devore technique was combined with digital printing of the flower motif. Because devore requires using a cellulose and non-cellulose blend, a light weight silk and rayon blend fabric was used. The fabric itself was translucent, and after burning out certain areas, delicate and detailed textures were created on the surface. For the inner layer, heavier silk was selected and color patterns were created with a resist dyeing technique. Silk gauze was used for the ruffled wings.

2.3.2 Garment Surface Design

To design the outer fabric layer, a commercial dress pattern was digitized and transferred to Photoshop. The flower motifs were positioned around the garment pattern pieces in such a way as to match the design at the sewing line when the dress was constructed. Then, each pattern piece containing the flower designs was rearranged to create a marker, or cutting layout, which allows the optimum usage of fabric. Figure 5 shows the surface design laid out on the pattern for the dress. This imagery was digitally printed and was used to create the outer fabric layer.

After printing, devore was applied to specific selected areas, such as flower leaves. A stencil technique with freezer paper was used to create patterns. The selected areas were outlined with the paper pattern and fiber etching paste was applied on that area. After drying the paste, heat was applied to burn the cellulose away, and then the fabric was washed.

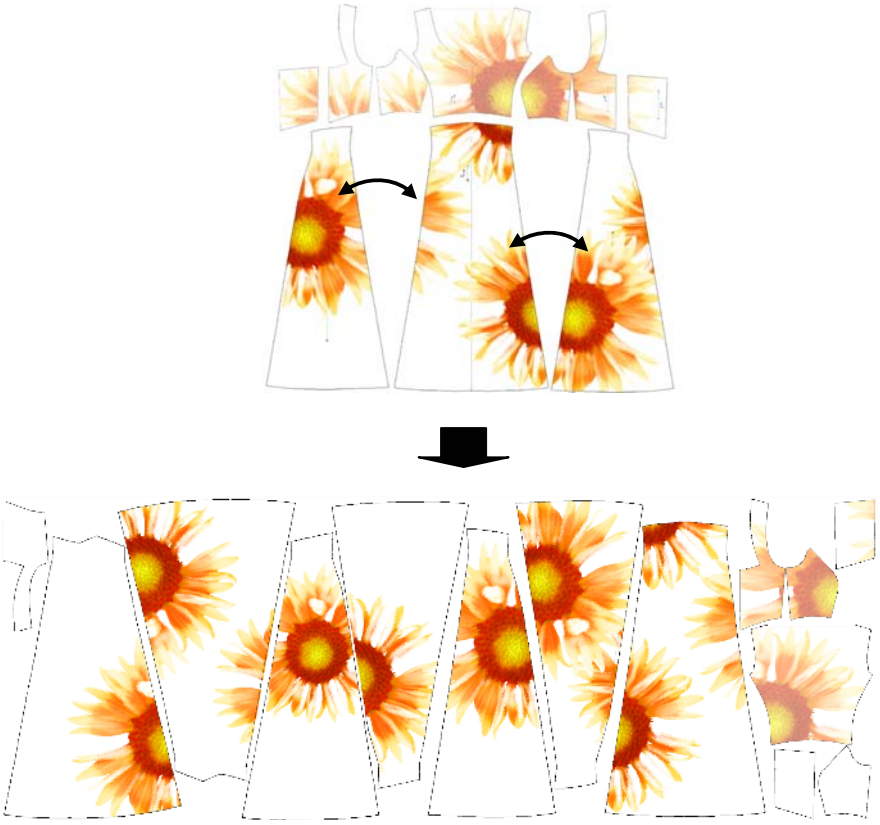


Figure 5: Garment development

An inner fabric layer was created with resist dyeing techniques to create the color and pattern. The main color palette was selected from the initial color swatches. The fabric was folded randomly and tied to create the pattern shown in Figure 6.

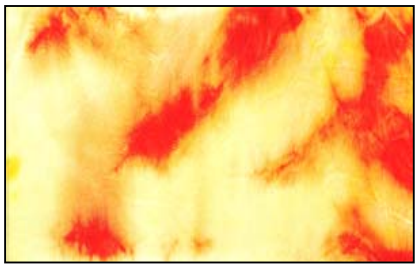


Figure 6: Resist dyed color pattern

This dress includes several pleated wings on both sides and in the back. Delicate pleats were created by applying the Arashi Shibori technique on the digitally printed fabric.

3. RESULTS AND DISCUSSION

3.1 Surface Design

A flower motif was created by merging three different techniques. Figure 7 shows the output of each technique. First, the motif was digitally printed on the silk and rayon blended fabric. Then, part of flower image was burned out, and creating different shades on the surface. A colored pattern was created with resist dyeing on a heavy silk fabric for an under layer. These two fabrics were layered together and subtle, intricate colors and patterns emerged. The flower motifs were originally intended to be more bright and deep. However, the light weight silk provided limitations in creating dark shades. This surface design was integrated into development of a unique dress design.

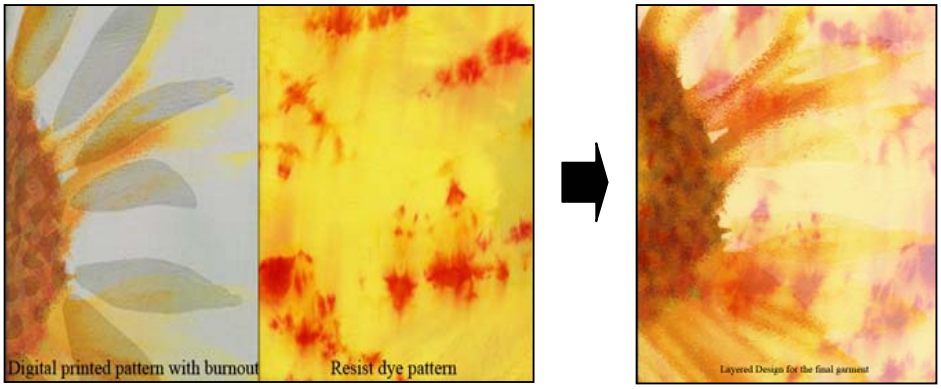


Figure 7: Surface design

3.2 Garment Development

Figure 8 shows the front and back views and details of the final garment. Color and pattern were successfully merged together. Spray starch was applied to help fix the pleated wings and heat-setting with wired support helped them to stay stiff on the side and back.

(a) Front view (b) Details (c) Back view

Figure 8: Final garment images

4. CONCLUSIONS

The integration of traditional textile design techniques and new technology can create innovative design effects in terms of color and pattern developments. Traditional techniques are labor intensive, but give subtle and delicate textures on the surface. Digital textile printing allows freedom in the usage of color and imagery. This project shows that the integration of digital and traditional techniques can enhance design capabilities and creativity.

5. REFERENCES

Brito, K.K., 2003, Shibori: Creating Color & Texture on Silk, Watson-Guptill, New York.

Hill-Campbell, J. M., 2002, "Digital Fusion: Combining traditional textile techniques with digital fabric printing", Retrieved May 19, 2006, [http://www.techexchange.com/thelibrary/digital_printing_fusion.html]

Lauer, A. D., and Pentak, S., 2000, Design Basics, 5 ed., Brace & Company, Orlando.

Lee, I., 2000, Fabric etching, Columbus, Ohio.

Singer, M. & Syurou, M., 2000, Textile Arts, Davis Publication, London.

Ujiie, H., “The effect of digital textile printing technology on textile design styles”, Retrieved May 19, 2006, [http://www.techexchange.com/thelibrary/DTP-TextileDesign.html]

Wada, I. Y., 2002, Memory on Cloth: Shibori Now, Kodansha International, New York.

Wong, W. and Wong, B., 2001, Visual design on the computer, W.W. Norton &

Company, New York.

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