〔보 문〕

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A Study on the Print Design Development Utilizing Tie-Dyeing Technique -Using CAD-

홀치기 염색기법을 활용한 날염 디자인 개발에 관한 연구

-CAD를 이용하여-

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Abstract

본 연구는 염색과정중에 발생하는 수질오염을 줄이고 또한 홀치기염색기법에 의해 제작된 패턴을 모티브로 하여 수작업에서 얻지 못한 다색의 사용을 가능케 함으로써 새로운 느낌의 홀치기 문양 표현과 3D 모델링을 통하여 텍스타일디자인이 상품화되었을 때의 효과를 CAD를 이용하여 살펴보고자 한 것이다.

연구방법으로는 가장 일반적인 실로 묶기, 전통적인 손바느질 느낌이 나는 시침질, 현대적 느낌이 강한 깡통에 의한 묶기와 기하학적 효과가 나는 접기 등의 홀치기염색기법으로 수작업한 다음 CAD를 이용하였다.

연구의 결과는 다음과 같다.

첫째, 홀치기염색기법에 의해 제작된 패턴을 모티브로 하여 수작업에서 얻지 못하는 다색사용가능성이 주메뉴의 색정리, 색4전개, 색바꾸기를 사용함으로써 가능하였다.

둘째, 다양한 색을 얻기 위해서 홀치기 염색의 수작업에서는 상당한 시간과 노력을 필요로 하지만 CAD를 사용함으로써 이러한 작업이 몇 가지 메뉴의 사용으로 짧은 시간 내에 쉽게 이루어질 수 있었다.

셋째, CAD를 통한 홀치기염색패턴의 새로운 이미지 효과를 얻기 위해 Solarize와 Intensity Direct, Effect/Emboss를 사용함으로써 다양한 질감과 새로운 이미지의 홀치기염색패턴을 얻을 수 있었다.

넷째, 위의 작업과정을 통하여 수작업에서 발생하는 수질오염을 줄일 수 있었다.

다섯째, 이상에서 얻어진 염색패턴을 3D모델링을 통하여 상품의 제작과정과 소비자에게 착용되었을 때의 효과를 미리 볼 수 있음으로 인해서 생산자의 실패율을 줄여줄 수 있을 것으로 본다.

여섯째, CAD를 이용한 이러한 일련의 과정들이 텍스타일산업 분야에 충분히 기여할 수 있을 것으로 기대된다.

Key words: tie-dyeing technique, CAD, textile design, multicolor way, 3D mapping;
홀치기 염색기법, 캐드, 텍스타일 디자인, 다색상 전개, 3D 모델링

I. Introduction

This study examines patterns manufactured through tie-dyeing techniques for motif, with the aim of decreasing the amount of water pollution that generally occurs during the dyeing process. In addition, the tie-dyeing technique allows the use of

many more colors than in hand dyeing and leads to a new expression of variegated patterns. And we examine the effect of tie-dyeing and of textile designed goods by 3D modeling. The CAD that is used in this study is the Texpro design system of Youngwoo Co., LTD. that is the textile special CAD. Using this CAD, means that fashion material development reflecting consumers sensitivity and character can result in a design differentiation strategy and a high added value in modern fashion material competition.

In South Korea the regular induction of CAD has occurred since 1990 and contributed to the development of design with a competitive power in the textile field[1]. Also, studies about textile design that use CAD have actively promoted its use[2~20]. With the utilization of CAD, a great many shapes or colors can be utilized according to the designers ideas. Therefore, the enterprise activity has an advantage because the processing speed or variation of design is easy[2].

Tie-dyeing is different from patterns designed by hand in that the technique of binding and drawing up dominates the personality of the pattern. Patterns tend to reflect nature, revolution, freedom, and painting. Therefore, tie-dyeing techniques express extravagance and art at the same time. In addition, the popularity of this technique results from the variety of possible patterns.

Tie-dyeing mean that cloth is dyed while tied. The technique has changed greatly since ancient times. Tie-dyeing is a unique dyeing method that is as relevant to today as it was in the past. When humans first tried to dye patterns onto cloth, they used techniques such as paraffin dyeing and clay earth, which have the longest history among various dyeing techniques. Tie-dyeing involves binding one part of the cloth using for example thread, tape, or board, or sewing or folding to display the pattern. Interestingly, there are almost 100 different types of tie-dyeing techniques[21] all of which create diversified expressions. But, the basic techniques entail binding, tying (glass beads, small stones, buttons etc.), tacking, folding, and using tie-dyeing plates and de-colorization, as well as tie-dyeing that uses other complex techniques [22].

An examination of studies connected to tie-dyeing, reveals that Lee[21] studied intentional pattern expression by design principle on the basis of various types of technique in tie-dyeing. It is the general opinion that tie-dyeing is made by accidental effect. However, this study confirmed that it is possible to express an intended design exactly, though it also presented the problem of the difficulty and time consumption involved in multicolor use when dip-dyeing.

According to Moon's[3] study, these problems can be solved using CAD. Nevertheless, because the software that is used in this study is a general graphic system, it indicates that the difficulty is connected to pattern application or resolution rather than the application system by textile special CAD. Also, the study connected with tie-dyeing was mainly concerned with textiles for interior design. Therefore, when using special CAD for textile design, the correction of textile design, analysis, and manufacture can be achieved more easily than with a general graphic system.

Accordingly, the production industry line is expected to clearly benefit. Moreover, in the 21st century, this tie-dyeing technique reflects the fashion trend towards naturalism, restoration, and ethnicity as a reaction towards environmental pollution and ecocide in modern scientific civilization. Tie-dyeing techniques are a means of utilizing the added value of a differentiation strategy of design for competitive power. This study maintains that the natural effects of tie-dyeing

Table 1. Characteristic of cotton fabric

Fabric	Weave	Yarn Number		Fabric counts (thread/5cm)		Weight
		Warp	Weft	Warp	Weft	(g/m^2)
Cotton	Plain	30'S	36'S	141	135	100±5

techniques are suitable for creating a pattern motif.

Ⅱ. Method & Consideration

1. Textile Design Manufacture

The fabric used in this study was white cotton for colorfastness prescribed by KSK0905, and the characteristics of the fabric are described in Table 1.

The dye used in this study is the German BAYER Company's SIRUS direct dye. The concentration of dye is 1% and 5%. The catalyst used was NaCl. The tie-dyeing technique was as follows: 1) binding mainly with yarn, 2) tacking using a traditional needlework impression, 3) binding with an empty can to create a modern impression, 4) folding to create a geometrical effect. This study utilized the above process and was designed by CAD.

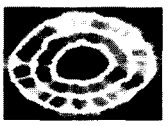
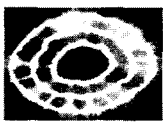
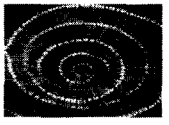
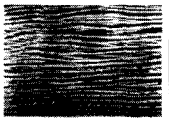
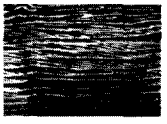
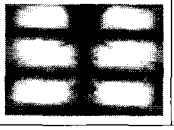
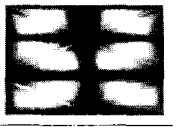
In addition, this study used a TexPro Pentium-Ⅱ 400MHz Computer, RAM of 64MB, software of TexPro 7.01, Tablet, design workstation with Wireless mouse & Style Pen, a HP6200C Color Scanner, a HP1120C color printer, and an I/O station that consisted of a Controller & T.P.U.

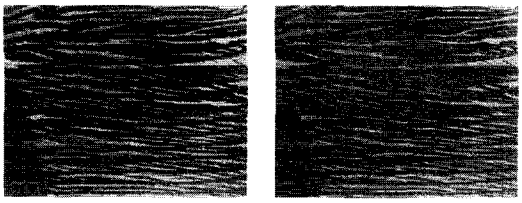
2. Color Technique of the Tie-dyeing Pattern using CAD

A hand-manufactured tie-dyeing pattern became the motif of this study. We used mainly color groupings of the main menu, color combo, and color change to investigate multicolor use possibilities that are not possible in hand work through CAD. This study took advantage of tie-dyeing techniques by binding, tacking, using an empty can, folding, and dying using concentrations of 5% and 1%.

Motifs that were scanned using the tie-dyeing pattern appear in Table 2. Binding techniques used yarn, the most general method among tie-dyeing techniques. Dyeing pattern by tacking produced a traditional needlework impression. Dyeing pattern using an empty can created a modern and cubic effect. The dyeing pattern by folding created a geometrical effect. Utilizing a concentration of 5% created more of an activity characteristic in the motif of the pattern than the concentration 1%. Fig. 1~3 reveal the multicolor dose

Table 2. Tie-Dyeing Pattern with Scanning

Dyestuff Conc. / Dyeing Pattern	1%	5%
Binding		
Tacking		
Can		
Folding		



12 Deg. 20 Deg.

Fig. 1. Multicolor Way1 with Color Change(5%, Can)

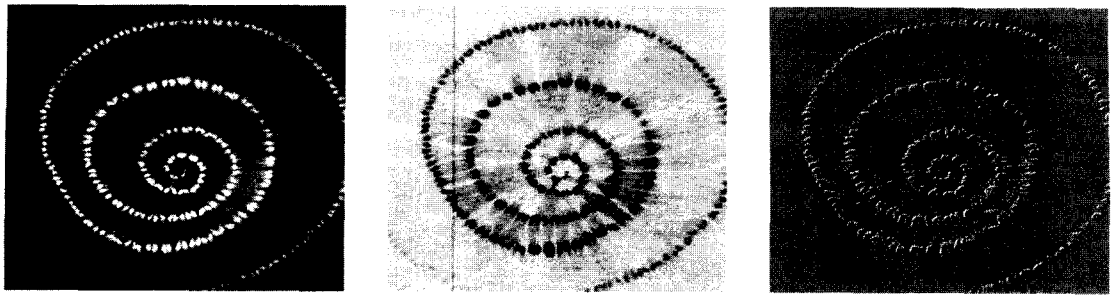
method after using a dye concentration of 5%.

Dye concentrations of 1 % and 5 % were mixed in temperatures of 12 degrees and 20 degrees in order to facilitate a multicolor mix. When mixing the color combo, 12 degrees were the maximum permitted by the computer and 20 degrees the maximum from the present production line. Through this color grouping, the colors of the scanned tie-dyeing pattern were automatically grouped in the same order. For the multicolor method, 2001/2002 F/W color that is applied in Inter Fashion Planning is used. Using such applied color, dye concentration of 1% and 5% led to color change after doing color grouping at 12 degrees

12 Deg. 20 Deg.

Fig. 2. 3D Mapping with Color Change(5%, Can)

Fig. 3. 3D Mapping of Dyeing Pattern with 4 Color Way(5%, Can)



A B C

Fig. 4. New Image Effect(5%, Tacking)

and 20 degrees. The result of color grouping at 20 degrees compared to 12 degrees is brighter color (see Fig. 1).

For the multicolor way, color change was achieved by 3D modeling. Fig. 2 demonstrates 3D modeling with Fig. 1.

Patterning by binding, tacking, using an empty can, folding, and scanning as in Table 2 became the color combo. As the color combo is possible at 12 degrees, this could be automatically relocated according to the selected color as well as four colors appearing at the same time on a screen. Also, the distance between each color of HLS could be retained, and this method of coloring demonstrated the possibilities of multicoloring because of the change to whole color tone. Tie-dyeing requires much time and effort by hand to get various colors. But by using CAD the work could be completed in a short time and a new color pattern could easily be obtained.

Patterning using an empty can with a dye concentration of 5% became the color combo. Fig. 3 shows 3D modeling after changing this to HLS' s color tone.

3. The Effect of New Impression Tie-Dyeing using CAD

The image effect of the tie-dyeing pattern was examined using Solarize, Intensity Direct, and Effect/Emboss. The image produced by Solarize showed a dyeing effect opposite to that of a tie-dyeing pattern. That is, the dyed portion and the portion that was not dyed showed another image being changed into each other. Also, we could obtain a new image effect using Intensity Direct, Effect/Emboss.

Fig. 4 shows the first scanning of the tacked tie-dyeing pattern. The image of B is the Solarize effect. The image effect of C demonstrates the application of the Emboss/Effect after using Intensity Direct. Also, the Solarize and Intensity Direct and Effect/Emboss pattern permits multicolor and various image effects because of 3D modeling using a multicolor method and color change.

III. Conclusion

This study aimed to decrease the water pollution that occurs during the dyeing process. The manufactured pattern is created using tie-dyeing techniques for the motif. This work permits multicolor use that is not possible in hand dyeing. Therefore, it can easily express a new impression in a tie-dyeing pattern. Solarize technique enabled the examination of the portion that was not dyed. Also, the effect on commercialized textile design

was examined via 3D modeling using CAD. The study results are as follows:

First, the possibility of multicolor use, that cannot be obtained in hand dyeing, was demonstrated using color grouping, color combo, and color change.

Second, the manual work of tie-dyeing needs much time and effort to produce various colors. But, CAD' s use could achieve it in a short time.

Third, CAD using Solarize, Intensity Direct, and Effect/Emboss could produce a tie-dyeing pattern of various textures and with a new image.

Fourth, the method used in this study could decrease the water pollution that occurs in hand dyeing.

Fifth, we expect that producers can improve the efficiency of goods production because we can examine beforehand the manufacturing process of goods and clothing effects through 3D modeling.

Finally, such a process, which takes advantage of CAD, is expected to contribute significantly to the textile industry field.

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