



INFLUENCE OF FABRIC WEIGHT, THREAD COUNT AND TYPE OF WEAVING OF TEXTILE MATERIALS ON COLOUR REPRODUCTION IN SCREEN PRINTING

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Abstract:

The most used printing techniques for textile printing are screen and digital printing. Selecting appropriate printing technique is important and it is necessary to know all the influential parameters in order to fully satisfy the customer. One of the most important parameters is textile materials, because characteristics of textile materials can determine their behaviour in printing process. This paper presents research regarding influence of fabric weight, thread count and type of weaving of textile materials on print reproduction in screen printing. Two types of materials used in the experiment were natural materials with composition of 100 % cotton and artificial materials with composition of 100 % polyester. Materials of the same composition had different characteristics like fabric weight, thread count and type of weaving. Two variations of each material composition were printed. The hypothesis of this experiment was that textile material with same composition but different fabric weight, thread count and type of weaving, regardless of whether they are natural or artificial origin, will have different colour reproduction in same printing condition.

Keywords:

screen printing, type of materials, plastisol inks

1 INTRODUCTION

The most used printing techniques for textile printing in today's market are screen and digital printing. The advantages of screen printing are simple printing process, equipment price and speed [1, 2]. Screen printing is a printing technique that uses a mesh to support an ink blocking stencil. The attached stencil forms open areas of mesh that transfer ink or other printable materials which can be pressed through the mesh as a sharp-edged image onto substrate. A fill blade or squeegee is moved across the screen stencil, forcing or pumping ink into the mesh openings for transfer by capillary action during the squeegee stroke [3].

One part of textile industry engaged in the production and processing of textile materials extra ribbon shape. That products could have different characteristics of used materials like fabric weight, thread count, type of weaving etc. This is very important because characteristics of textile materials can determine their behaviour in printing process [4].

This paper presents research regarding influence of fabric weight, thread count and type of weaving of textile materials on print reproduction in screen printing. The aim was to determine how fabric weight, thread count and type of weaving affects on colour reproduction.



2 EXPERIMENTAL

Two types of materials used in the experiment were natural materials with composition of 100 % cotton and artificial materials with composition of 100 % polyester. Materials of the same composition had different characteristics like fabric weight, thread count and type of weaving. Two variations of each material composition were printed. The properties of the materials are presented in Table 1.

Table 1: The properties of the materials used in the experiment

Material	Material composition	Fabric weight (g/m ²)	Thread count (p/10 cm)	Type of weaving
Cotton 1	100 % cotton	236	110	Twill
Cotton 2	100 % cotton	710	63	Twill
Polyester 1	100 % polyester	267,5	90	linen
Polyester 2	100 % polyester	2836,5	120	Double weaving

Materials were printed by screen printing technique, using Schenk Variprint with screen fineness of fabric 32, ink used was Plastisol inks by Sericol. Magenta and gray colours were printed on materials.

The hypothesis of this experiment was that textile material with same composition but different fabric weight, thread count and type of weaving, regardless of whether they are natural or artificial origin, will have different colour reproduction in same printing condition.

CIE L* a* b* coordinates of all printed samples were measured using spectrophotometric measuring device. The CIE L* a* b* coordinates values were determined by the analysis of printed or colored samples [5, 6, 7]. Device used for spectrophotometric measurements was HP 200 spectrophotometer. HP 200 used d/8 measurement geometry with 16 mm aperture, with D₆₅ standard illuminant and 10° standard observer. After that, we determined colour difference between printed samples with same measurement's conditions.

3 RESULTS

For accuracy of results, each measuring field was measured five times, after which the mean value for parameters L * a * b * were presented in table 2 (spectrophotometric measurements for samples printed with grey colour) and table 3 (spectrophotometric measurements for samples printed with magenta colour).

Table 2: Spectrophotometric measurements for samples printed with grey colour

Material	L	a	b
Cotton 1	57,12	-1,97	-3,69
Cotton 2	55,68	-1,83	-3,40
Polyester 1	59,48	-1,80	-3,77
Polyester 2	60,47	-1,78	-3,75



Table 3: Spectrophotometric measurements for samples printed with magenta colour

Material	L	a	b
Cotton 1	32,85	28,26	2,09
Cotton 2	36,34	49,02	7,47
Polyester 1	50,80	19,32	-0,49
Polyester 2	36,69	48,04	6,83

After spectrophotometric measurements for samples printed with grey and magenta colour, we determined color difference between samples printed on same material composition. These results are presented in Figure 1.

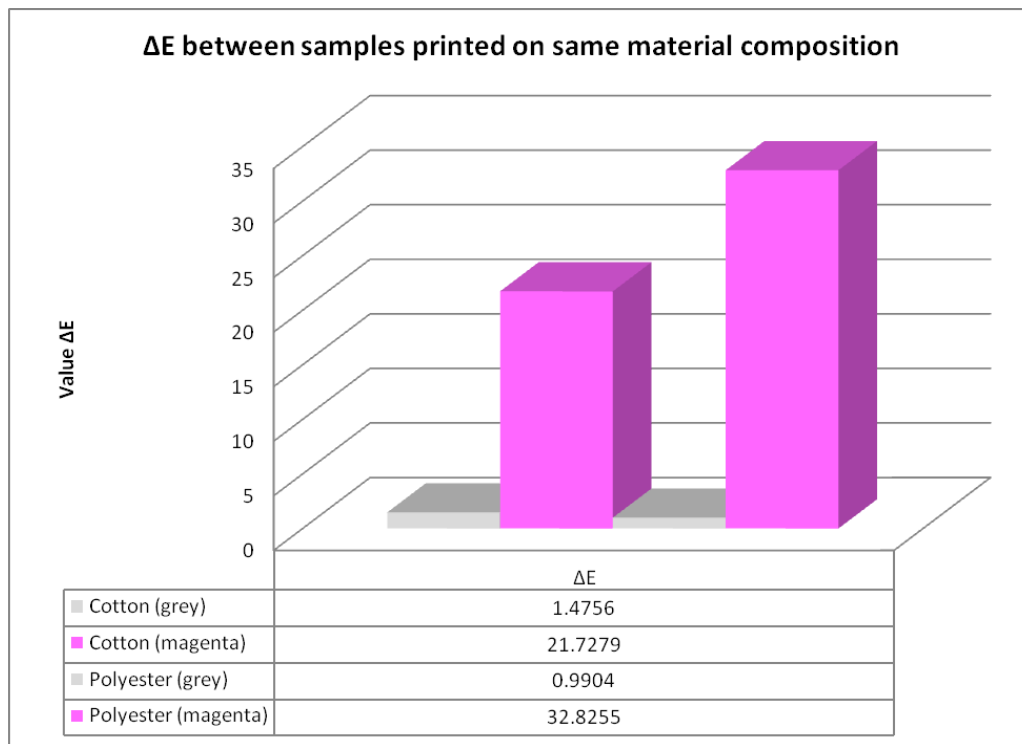


Figure 1: Colour difference between samples printed on same material composition

4 DISCUSSION

Spectrophotometric measurements for samples printed with grey and magenta colour showed that differences of the materials had influence on colour reproduction. Changes were noticed in all three coordinates of the CIE L^* a^* b^* and colour difference were determined between samples printed with same colour on same material composition. Materials printed with magenta colour showed significantly bigger colour differences between samples.

Based on these results, it can be said that the differences of the material properties have an effect on the colour of printed samples, though the characteristics of the used ink are very important also.



5 CONCLUSION

The results of the analysis supported the hypothesis that the materials with same composition, but with different fabric weight, thread count and type of weaving, natural origin as well as artificial origin, have different colour reproduction in screen printing. Some of the future research could include the impact of other factors on the print quality, as well as external influence on the printed material, such as colour fastness to light, washing, rubbing and other chemical and physical agents.

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