(REFEREED RESEARCH)

A STUDY ABOUT PARAMETERS AFFECTING THE MARKER PLAN EFFICIENCY

PASTAL PLANI VERİMLİLİĞİNİ ETKİLEYEN FAKTÖRLER İLE İLGİLİ BİR ÇALIŞMA

Oktay PAMUK[1], Esra Zeynep YILDIZ[2]

[1]*Ege University, Textile Engineering Department, Izmir, Turkey*
[2]*Ege University, Emel Akin Vocational Training School, Izmir, Turkey*

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ABSTRACT

The aim of this research is to determine the effects of fabric width, spreading mode, bundling option and automark placement strategy on the marker plan efficiency of 2 different top garments. For this purpose, 64 markers were prepared on the Gerber AccuMark Version 9 CAD system. When the marker efficiency ratios were compared, the highest efficiency values were obtained with 160 cm fabric width for both models. And also, higher efficiency values were achieved by face-to-face spreading mode.

Keywords: Marker plan, CAD system, Marker efficiency, Fabric width, Spreading mode, Bundling, Automark.

ÖZET

Bu araştırmanın amacı, 2 farklı üst giyside kumaş eni, serim şekli, bandıl seçeneği ve otopastal yerleşim stratejisinin pastal planı verimliliği üzerine olan etkisini incelemektir. Bu amaç doğrultusunda, Gerber AccuMark V.9 CAD sistemi kullanılarak 64 pastal planı oluşturulmuştur. Pastal planı verimliliği oranları karşılaştırıldığında, her iki model için de 160 cm kumaş eniyle çalışıldığında en yüksek verimlilik değerleri elde edilmiştir. Ayrıca yüz yüze serim şekli ile yüksek verimlilik değerlerine ulaşılmıştır.

Anahtar Kelimeler: Pastal planı, CAD sistemi, Pastal verimliliği, Kumaş eni, Serim şekli, Bandıl, Otopastal.

Corresponding Author: Oktay Pamuk, oktay.pamuk@ege.edu.tr

1. INTRODUCTION

Garment industry contributes a high percentage in the country's total revenue but still facing many challenges. Nowadays, customers have become more demanding and are always looking for new styles and designs in the stores more frequently, which affects the turnaround time from concept to consumer. This is putting enormous pressure on the manufacturers to do the same process in shorter lead time. With the increasing competition and decentralized manufacturing, garment industries are looking forward to different software solutions to systematize the processes and overcome their challenges [1].

Devices performing high-tech services in the apparel industry are commonly referred to as "CAD/CAM". In the apparel industry, CAD systems are mainly used in the preproduction phase such as garment design, pattern preparation, pattern grading and marker making which is labour-intensive [2].

One of the preproduction phase, marker making, is the process of determining the most efficient layout of the pattern pieces for a specific style, fabric, and distribution of sizes. Marker efficiency is much hyped, as it is easily quantifiable in terms of percentage of fabric consumption [3]. The process of laying out patterns is constrained by fabric grain, visual orientation of the finished surface of fabrics, color and design matching between adjacent fabrics, pile direction, etc [4].

Fabric consumption is the most important factor constituting the garment cost. Productivity analysis must be concentrated on fabric, which is the most important element making-up the garment. Model and size of the garment, fabric width and assortment plan determine the fabric usage for a garment [5]. Any reduction in the amount of the cloth used per garment leads to increased profit. The minimization of fabric wastage is crucial to the reduction of production costs. A higher efficiency marker results in better savings [3].

Before the development of computerised marker planning systems, all markers were planned by working with full-size patterns. This method may still be used where companies make only short or single garment markers (e.g. customised tailoring) and the planner can see the whole of the plan relatively easily. The planner works by moving around the full-size patterns until a satisfactory plan is obtained. Sometimes this planning is done directly on the fabric to be cut and the pattern shapes marked in immediately [6]. The waste of material in manual marker making amounts of 13-15% and the job time may require several days per suit. This efficiency in manual marker making differs from one expert to another [4].

Most attempts to minimize the amount of fabric waste have focused on various types of marker-making software that place the garment pieces on a length of fabric as compactly as possible. CAD is being used by most of the apparel companies for marker making [1].

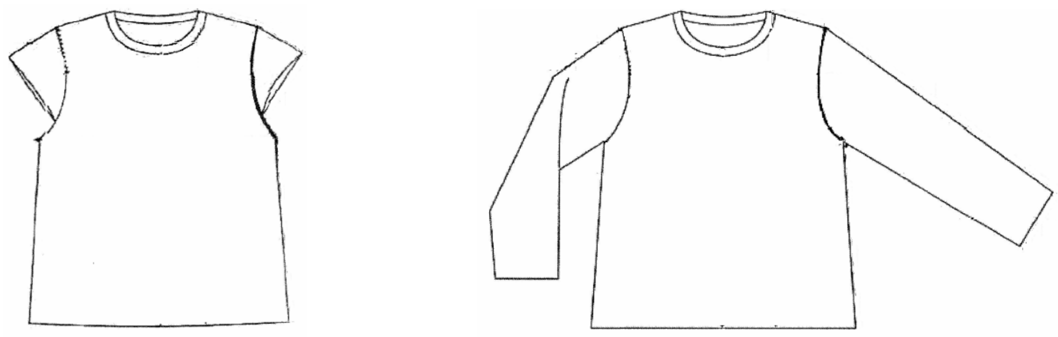
There are many benefits of computer assisted marker making. Material utilization can improve from 1 to 3 per cent over that of a miniature marker maker. One operator can make five markers by computer in the time it takes to produce one manual marker in full scale. Reduced labour costs and faster production are the benefits [7]. Due to less time consumption factories can work on different markers for assorted fabric widths and increase the fabric efficiency and make money [1]. Records of the markers are stored on the computer or on disk, protected from damage and easily retrieved for reference or reuse. The markers are of higher quality, as pieces cannot slip, so cutting lines are more consistent. Plaids and stripes are more easily matched. Pieces cannot be forgotten and accidentally left out. The current systems can also be integrated with computerized numeric cutters for automatic cutting of the garments [7]. Also after preparing marker plan, the computer will provide an accurate piece count, calculate a marker plan efficiency percentage and total the length of the pattern peripheries [6].

The aim of this research is to determine the effects of fabric width, spreading mode, bundling option and automark placement strategy on the marker efficiency. For this purpose, 2 different top garments were studied; t-shirt and long sleeved blouse. 64 markers were prepared on the Gerber AccuMark Version 9 CAD system and the marker plan efficiencies were compared.

2. MATERIAL AND METHOD

2.1 Material

Two different children's top garments were chosen for the study (Figure 1). Design, specification and measurements sheet were taken from a manufacturer located in Izmir. Size tables are given in Tables 1 and 2.



a b

Figure 1. Technical drawing of the (a) Model A, (b) Model B.

Table 1. Size table of Model A

	Sizes (cm)						
Measurements (age)	**3-4**	**4-5**	**5-6**	**7-8**	**9-10**	**11-12**	**13-14**
Chest width	30	31.5	33	35	37.5	40	42.5
Hem width	32.5	34	35.5	37.5	40	42.5	45
Shoulder width	4.5	5	5.5	6	6.8	7.5	8.8
Length (center back)	36	38.5	41.5	46	50.5	55	59.5
Neck width	14.5	15	15.5	16	16.5	17	17.5
Front neck drop	6	6.5	7	7.5	8	8.5	9
Back neck drop	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sleeve length	5.2	5.4	5.7	5.9	6.4	6.9	7.4
Cuff width	10.5	10.5	11	11.5	12	12.5	13
Armhole	14	14.5	15	16	17	18.5	20

Table 2. Size table of Model B

	Sizes (cm)						
Measurements (age)	**3-4**	**4-5**	**5-6**	**7-8**	**9-10**	**11-12**	**13-14**
Chest width	31	32.5	34	36	38.5	41	43.5
Hem width	34	36	36	38	40.5	43	45.5
Shoulder width	6	6.5	7	7.5	8.3	9	10.3
Length (center back)	34.5	38	41.5	46	50.5	55	59.5
Neckline width	12.5	13	13.5	14	14.5	15	15.5
Front neck drop	4.5	5	5.5	6	6.5	7	7.5
Back neck drop	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sleeve length	34.7	38	41.7	46	51.3	56.5	61.5
Cuff width	7.5	7.5	8	8.5	9	9.5	10
Armhole	14.5	15	15.5	16.5	17.5	19	20.5

2.2 Method

The markers were prepared by using Gerber AccuMark Version 9 CAD system. First, the main size patterns were digitized and graded in 7 sizes. Then, the markers were prepared according to different fabric width, spreading mode, bundling option and automark placement strategies by the AutoMark editor that provides automatic replacement of pieces in a marker. Then the marker efficiency ratios were obtained.

Factors and levels considered for the study are given in Figure 2.

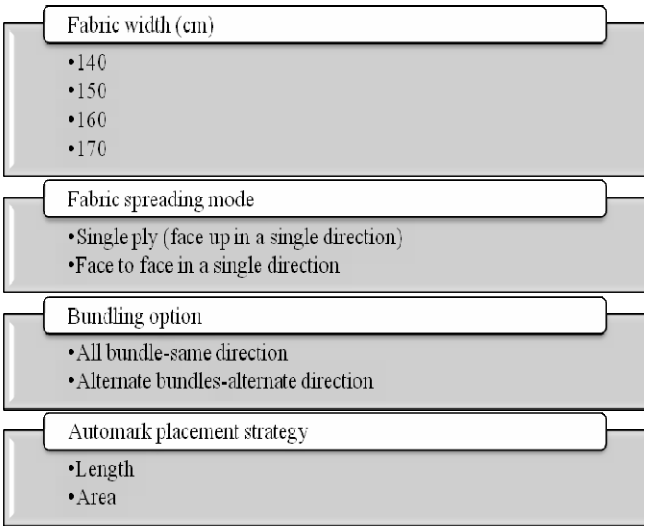


Figure 2. Factors and levels considered for the experiment

Fabric Width

Fabrics are set in different widths and this influences the efficiency of the marker plan. So that, in the study fabric width was chosen between 140 cm and 170 cm, and the marker plans were created in 4 different widths.

Fabric Spreading Modes

Depending on the pattern and other properties, a fabric may be spread in different ways. The spreading mode determines the placement of the face side of each fabric ply in a spread - up or down and the placement direction of each fabric ply in a spread - in one or both directions [8].

- Face up in a single direction: All the plies are spread with their face side up and in one direction (Figure 3). This is the most commonly used spreading mode.

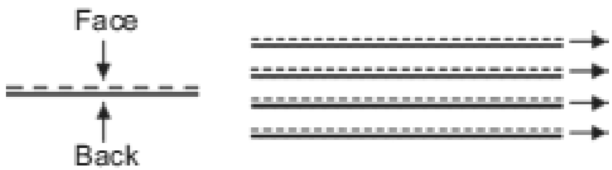


Figure 3. The placement of fabric plies performing "face up in single direction" spreading mode [8].

- Face to face in a single direction: The first material ply is spread with its face side up. After or during the "dead heading" movement, the fabric roll is turned through 180° and the next ply is spread in the same direction with its face side down (Figure 4). This spreading mode is used for materials with a short-cut pile (velvet, corduroy, plush, and artificial fur) to prevent the plies form slipping during the spreading and cutting processes.

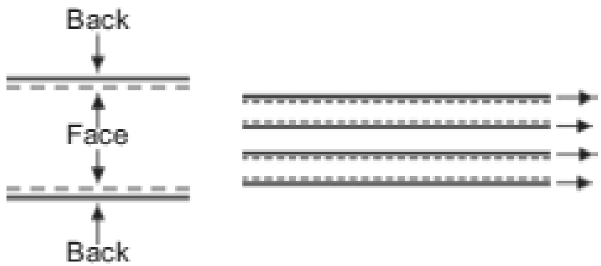


Figure 4. The placement of fabric plies performing "face to face in a single direction" spreading mode [8].

Bundle Selection

The direction in which the bundles will be retrieved is specified in Lay Limits Form.

- All bundle-same direction (A.B.S.D.): All bundles will be retrieved in the same direction.
- Alternate bundles-alternate direction (A.B.A.D.): Alternate bundles will be retrieved in alternate directions. Alternate bundles appear in the marker rotates 180 degrees.

Automark Strategy

The AutoMark editor provides the automatic placement of pieces in a marker by the computer. This feature is often used as an easy method to generate costing markers, or to generate preliminary placement of pieces when creating a marker. Automatic marking also encompasses marker optimization and size substitution. There are 2 options for automark strategy [9].

- Length: The system will place pieces with the largest length (or width) dimension first. This is the default setting.
- Area: The system will place pieces with the largest total area first and place pieces the smallest total area last.

The assortment plan was kept constant in the study (Table 3).

By using the selected parameters given in Figure 2, 64 markers were created and the marker plan efficiency percentage of each marker was measured using Gerber AccuMark software.

3. RESULTS AND DISCUSSION

The efficiency of the prepared markers is given in Table 4.

Table 3. The assortment plan of the models

Sizes	3-4	4-5	5-6	7-8	9-10	11-12	13-14
Assortment	1	1	1	1	1	1	1

Table 4. The results of marker plan efficiency

Model	Spreading Mode	Bundling Option	Automarker Strategy	Fabric Width (cm)			
				140	150	160	170
A	Single ply	Alternate bundles- alternate direction	Length	78,40	78,29	81,42	81,20
	Single ply	All bundle-same direction	Length	77,89	78,11	80,05	78,54
	Face to face	Alternate bundles- alternate direction	Length	76,58	81,25	80,43	81,31
	Face to face	All bundle-same direction	Length	74,87	77,74	80,90	80,01
	Single ply	Alternate bundles- alternate direction	Area	77,48	79,21	79,74	78,78
	Single ply	All bundle-same direction	Area	76,17	77,03	79,73	78,50
	Face to face	Alternate bundles- alternate direction	Area	78,15	80,75	81,19	80,39
	Face to face	All bundle-same direction	Area	76,87	78,12	80,64	79,30
B	Single ply	Alternate bundles- alternate direction	Length	78,75	78,79	79,13	79,07
	Single ply	All bundle-same direction	Length	77,66	78,25	78,54	78,00
	Face to face	Alternate bundles- alternate direction	Length	79,41	79,61	80,16	79,74
	Face to face	All bundle-same direction	Length	78,79	78,96	79,89	79,37
	Single ply	Alternate bundles- alternate direction	Area	78,52	78,66	78,84	78,20
	Single ply	All bundle-same direction	Area	77,40	77,50	77,78	76,86
	Face to face	Alternate bundles- alternate direction	Area	79,85	80,69	80,86	79,93
	Face to face	All bundle-same direction	Area	79,65	80,50	80,53	78,83

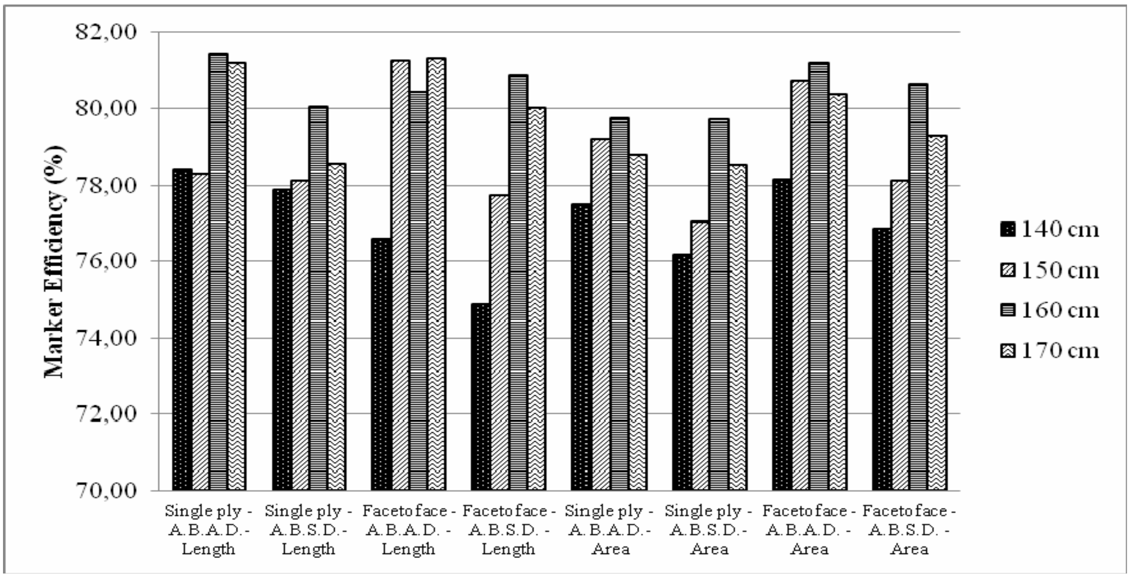


Figure 5. The marker efficiency of Model A according to fabric width

As the effect of fabric width on marker plan efficiency for Model A was analyzed (Figure 5), it can be seen that the fabric which has 160 cm width had the highest efficiency, while the fabric with 140 cm width had the lowest. When the “area” option was selected, efficiency increased, as the fabric width increased up to 160 cm level. However, after 160 cm, efficiency decreased.

When the effect of fabric width change on marker plan efficiency for Model B was analyzed (Figure 6), the highest efficiency was obtained with 160 cm fabric width. The least efficient marker plan occurred when “length” option was selected with 140 cm width and when “area” option was selected with 170 cm width. It was observed for Model B that, as the fabric width increased, efficiency also increased until 160 cm width. However, after 160 cm, efficiency decreased.

When efficiency of Models A and B are compared, for 140 cm fabric width Model B, for 160 and 170 cm fabric width Model A provided higher efficiency values.

As it can be seen from Figure 7, in 140 cm fabric width, for Model A higher efficiency values were obtained when “length” option was selected with single ply fabric spreading mode and when “area” option was selected with face to face mode. Higher efficiency values were observed for face to face fabric spreading mode for both “length” and “area” options for Model B.

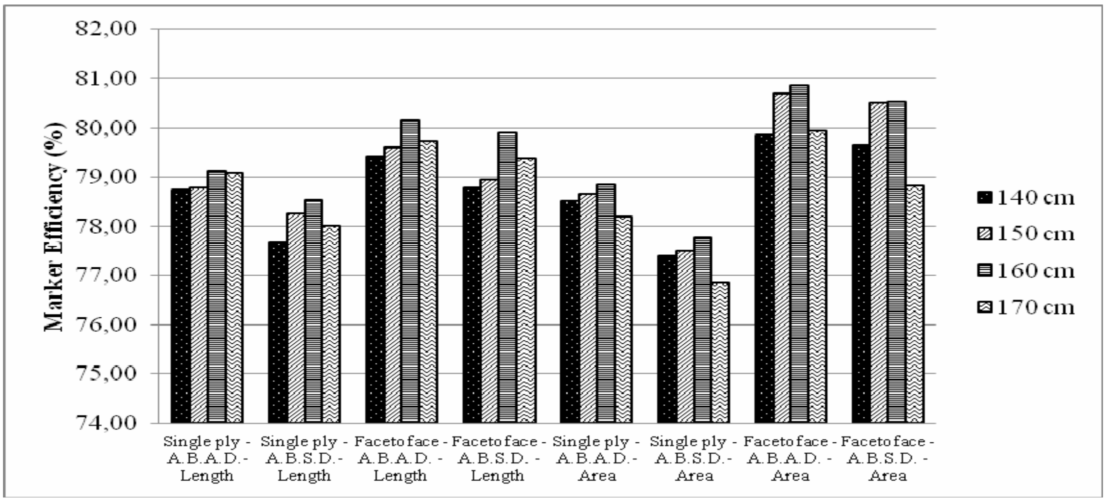


Figure 6. The marker efficiency of Model B according to fabric width

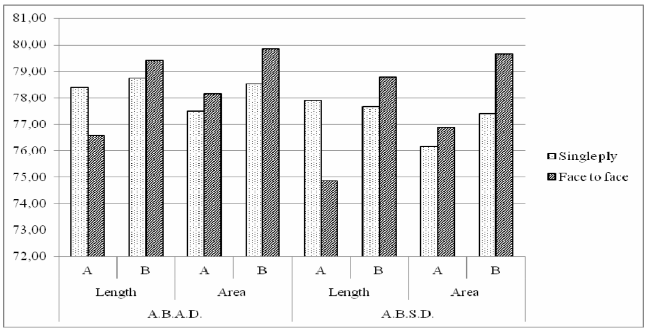


Figure 7. The marker efficiency according to fabric spreading mode (140 cm fabric width)

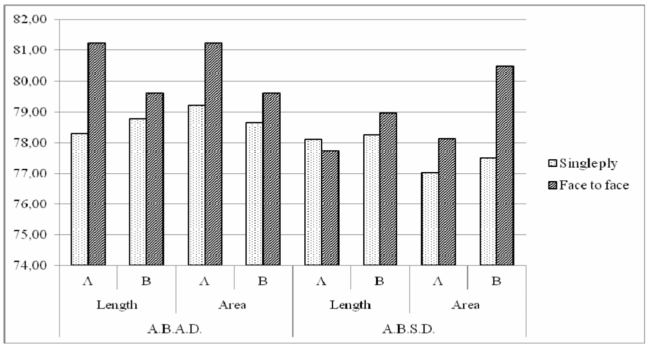


Figure 8. The marker efficiency according to fabric spreading mode (150 cm fabric width)

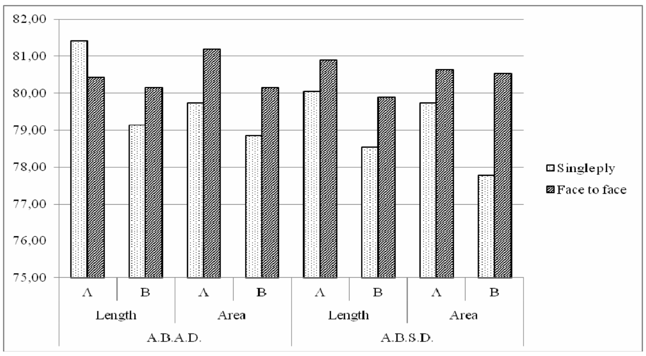


Figure 9. The marker efficiency according to fabric spreading mode (160 cm fabric width)

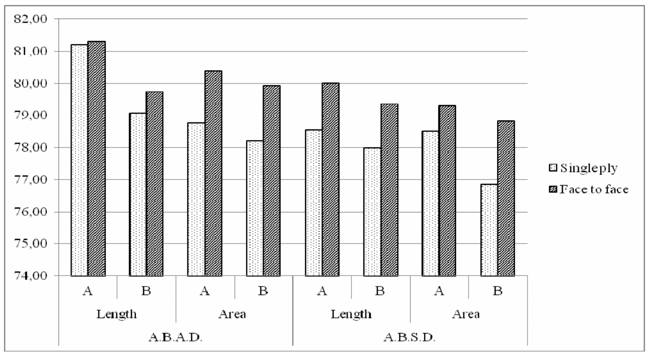


Figure 10. The marker efficiency according to fabric spreading mode (170 cm fabric width)

When Figures 8, 9 and 10 were examined, it was observed that for both models, higher efficiency values were achieved by face-to-face spreading mode for 150, 160 and 170 cm fabric widths.

4. CONCLUSION

The aim of this research is to determine the effects of fabric width, spreading mode, bundling option and automark placement strategy on the marker efficiency of 2 different top garments. For this purpose, 64 markers were prepared on the Gerber AccuMark Version 9 CAD system and the marker plan efficiencies were compared.

The results can be summarized as follows:

- For both models, the highest efficiency values were obtained with 160 cm fabric width.
- For model A, the fabric with 140 cm width had the lowest efficiency value whereas for model B, the least efficient marker plan occurred when “length” option was selected with 140 cm width and when “area” option was selected with 170 cm width.
- It was observed for both models that, as the fabric width increased, efficiency also increased until 160 cm width. However, after 160 cm, efficiency decreased.
- When efficiency of Models A and B were compared, for 140 cm fabric width Model B, for 160 and 170 cm fabric width Model A provided higher efficiency values.
- It was observed that for both models, higher efficiency values were achieved by face-to-face spreading mode for 150, 160 and 170 cm fabric widths.

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