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Impact of Marker Width to Optimize Fabric Cost of Garments

Md. Rafiqul Islam Manik[1], Ishrat Jahan[2]
[1]Department of Knitwear Manufacture & Technology,
BGMEA University of Fashion & Technology (BUFT),
S.R. Tower, 105 Uttara Model Town, Sector # 7, Uttara Dhaka-1230.
rafiqulislam@buft.edu.bd

[2]Department of Apparel Manufacture & Technology,
BGMEA University of Fashion & Technology (BUFT),
S.R. Tower, 105 Uttara Model Town, Sector # 7, Uttara, Dhaka-1230.
ishratjahannadia@buft.edu.bd

Abstract *The export of garment products to the world market has become very competitive in recent years. Buyers are demanding to get the products at lower price. Thus, the garment manufacturers need to minimize the cost of the product in order to sustain in the global market. Fabric covers the maximum cost of a garment in terms of percentage. If cost behind fabric can be minimized by utilizing maximum amount of fabric, the cost of the garment will definitely be lower. In this regard marker plays a very important role in usage of fabric. In this paper, we have studied an order where several markers were made in order to observe the influence of marker width to minimize the fabric cost. Finally, we found that marker width has a direct impact on fabric cost. With the change of width, the efficiency of the marker varies and ultimately the cost of fabric varies as well. So, the best width needs to be selected to minimize the fabric consumption and cost for an order.*

Key Words *Marker width, fabric cost, marker efficiency, garments etc.*

1. Introduction

One of the major activities of cutting room is marker making which is the process of determining the most efficient layout of the pattern pieces for a specific style, fabric and the distribution of sizes. In other words, a marker is a diagram of a precise arrangement of pattern pieces for a specific style and the sizes to be cut from a single spread [1] or the marker indicates how well all the pattern pieces of the garment are arranged on the fabric to achieve the most efficient layout [2]. Fabric consumption depends on marker efficiency. Marker efficiency is determined from fabric utilization, the percentage of total fabric that is actually used in garment parts in a marker [1]. Saving an inch of fabric ultimately has a pronounced effect on company profits, so marker planning receives close attention [2]. Since fabric is the most vital factor in costing a garment and it occupies 60 to 70% of the total cost of a garment. The generous use of fabric, heavy or dense fabric, fabric with rare fibers, complex fabrication, expensive finishes, fabric with patterns that require matching, amount of shrinkage can all add significantly to the cost of a garment [3]. Higher the marker efficiency, lower the fabric wastage. The minimization of fabric wastage is very important to the reduction of production cost of a garment [4]. Marker efficiency depends on a various number of factors and width of marker is one of the crucial factors out of those [5]. Marker planning is always a very open and creative process. One can follow his own decision [6]. Decision making is significant in the sense that it knocks off the time for making decision and enhances the productivity of the work. Decision making can be defined as the study of identifying and choosing alternatives based on the values and preferences of the decision maker [7]. During marker making, the marker planner takes the decision of selecting the appropriate width of the marker. Making a decision implies that there are will show that the change of marker width based on the decision of the marker planner has a great impact to reduce the cost of fabric.

2. Methodology

In this study, a basic t-shirt was picked as a model due to the fact that it is manufactured widely in small, medium and large scale in different companies in the apparel sector and it is in constant demand in the market throughout the year. The model consists of five parts like; front part, back part, two sleeves and a neckband. Single jersey fabric is considered for making front, back and sleeves. On the other hand, 1X1 rib fabric is considered for making neckband. The study was made for an order quantity of 20,000 pieces t-shirt.

Figure-1: Garment Model of a T-shirt

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alternative choices to be considered and in such a case the marker planner does not only identifies as many of these alternatives as possible but also chooses the one that has the highest probability of success or effectiveness in terms of saving the cost. Therefore, a study was carried out in CAD section of a garment industry named Palmal Group of Industries located at Shahjadpur, Dhaka [8]. In this study, we

size. In the first step, garment patterns of "M" size like; front, back, sleeves and neck were made according to the body measurements. After that, grading was done to get the complete size range. Lastly, marker was made including all the sizes in the assortment considering different marker width. Front, back and sleeves are contained in a marker and neckband is contained in another separate marker since

A size chart is used containing "S", "M", "L", "XL", "XXL" sizes which is given in table number 1.

SMART mark (an add on module to TUKA CAD) automatic marker making software has been used for making the markers.

The CAD system operator was chosen from Palmal Group of Industries who had 12 years of experience in the field. "M" size from the size chart was taken as the basic fabrication is different from front, back, sleeves to neckband. For front, back and sleeves, markers were made for total 8 bundles where each bundle will contain 4 parts of a garment. On the other hand, for neckband, markers were made for 32 bundles where each bundle contains a single part of that garment. The marker plan was done as below:

Table-1: Size Chart

Points of Measure : Flat Measurements	*Tolerance (+/-)*	*S*	*M*	*L*	*XL*	*2XL*	*Unit*
Front Length – HPS to HEM at HIP (Reg. Length)	1/2	-1/2	29	3/4	1 1/2	3	Inch
Bust and Chest Width – 1" Below Armhole	3/8	-2	20 3/4	2	4	6	Inch
Waist position from HPS (Tops)	1/8	-1/2	18	1/2	1	1 1/2	Inch
Waist from HPS (Tops)	3/8	-2	20 3/4	2	4	6	Inch
Hem/Sweep	3/8	-2	20 3/4	2	4	6	Inch
Hem Height	1/8	0	3/4	0	0	0	Inch
Back neck width – (Seam to Seam at HPS)	1/4	-1/4	7 1/4	1/4	1/2	3/4	Inch
Front neck drop (To Seam)	1/4	-1/4	4 1/4	1/4	1/2	3/4	Inch
Back neck drop (To Seam)	1/4	-1/8	1	1/8	1/4	3/8	Inch
Neck trim depth	1/8	0	3/4	0	0	0	Inch
Minimum neck stretch		0	26	0	0	0	Inch
Shoulder point to point (Regular)	1/4	-1	18	1	2	3	Inch
Across front - at mid armhole	1/4	-1	16 1/2	1	2	3	Inch
Across back - at mid armhole	1/4	-1	17	1	2	3	Inch
Shoulder slope/drop	1/8	-1/8	1 3/4	1/8	1/4	3/8	Inch
Forward shoulder	1/8	0	1/2	0	0	0	Inch
Armhole- straight (seam to seam)	1/4	-1/2	9	1/2	1	1 1/2	Inch
Short sleeve length over arm from C/B neck	3/8	-3/4	17 1/2	3/4	1 1/2	2 1/4	Inch
Sleeve opening – short sleeve	1/4	-1/2	6 3/4	1/2	1	1 1/2	Inch
Hem height at sleeve opening	1/8	0	3/4	0	0	0	Inch

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Marker plan for front, back & sleeves

Plan-1: Marker width = 66 inch (Figure-2)
Plan-2: Marker width = 70 inch (Figure-3)
Plan-3: Marker width = 74 inch (Figure-4)

Marker plan for neckband

Plan-1: Marker width = 58 inch (Figure-5)
Plan-2: Marker width = 70 inch (Figure-6)

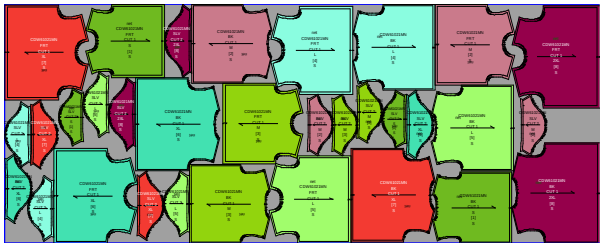

Figure-2: Plan-1 for front, back and sleeves

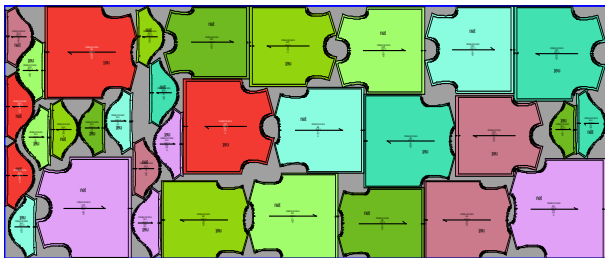

Figure-3: Plan-2 for front, back and sleeves

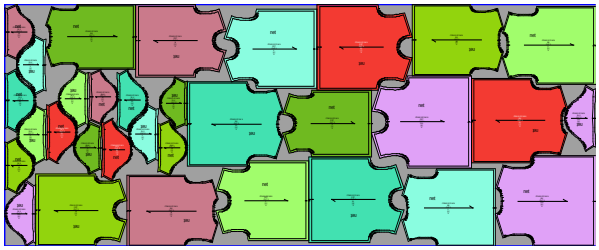

Figure-4: Plan-3 for front, back and sleeves

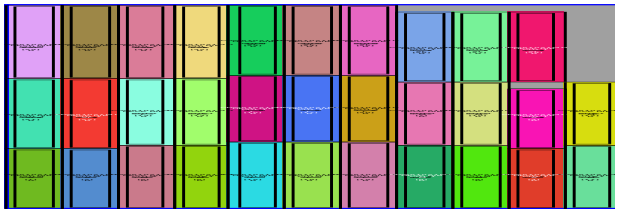

Figure-5: Plan-1 for neckband

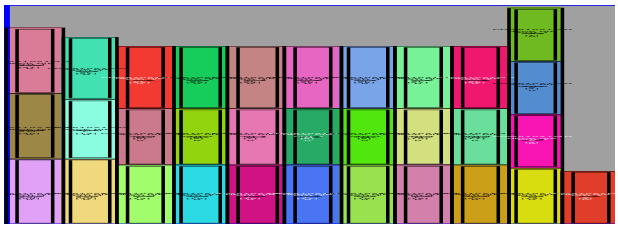

Figure-6: Plan-2 for neckband

To get the fabric width, we added 2 inch cutting allowance with the marker width. When the fabric is laid on the cutting table, cutting allowance is added with the marker length. We also added 2 inch cutting allowance with the marker length in order to get lay length of fabric. It can be expressed as below:

$$\text{Lay length} = \text{Marker length} + \text{Cutting allowance (2")}$$

$$\text{Fabric width} = \text{Marker width} + \text{Cutting allowance (2")}$$

Fabric price was taken from a fabric mill named "Aswad Composite Mills Limited".

Table-2: Fabric specification with price

Fabric Details	*Fabric Price Per kg*
100% cotton single jersey open width fabric, fabric weight = 160 gsm, (fabric width = 68 inch/72 inch/76 inch)	$ 5.20
100% cotton 1X1 rib open width fabric, fabric weight = 220 gsm , (fabric width = 60 inch/ 72 inch)	$ 5.80

Total fabric requirement (in kg) is calculated following the below formula:

$$\text{Fabric Requirement} = [\{\text{Lay length (in inch)} \times \text{Fabric width (in inch)} \times \text{Fabric weight} / (39.37 \times 39.37 \times 1000)] + \text{Wastage (\%)} \text{-----(1)}$$

By using formula number 1, fabric requirement for the number of bundles or garments in the marker will be derived. Then, we need to convert it to the fabric requirement for the whole order quantity of 20,000 pieces. In different stages of garments manufacturing, wastages are occurred in different sections of the factory. We have considered wastage of 8% for calculating total fabric requirement for that order. Total fabric cost is calculated by using formula number 2:

$$\text{Total Fabric cost} = \{\text{Total fabric requirement (in kg)} \times \text{Fabric price per kg}\} \text{-------(2)}$$

3. Result and Discussion

After completing marker making with different width, we got different length of marker having different efficiency. In table number 3, we got the following results:

For front, back and sleeves total three plans were made for making the marker by changing marker width. Total number of bundles per marker is 8 in case of all these three plans. Due to the change of width different results were found. The best plan is definitely plan number 3 as marker efficiency is higher in comparison with plan number 1 and 2. And for neckband, two plans were made. Although the number of parts were same, marker efficiency is better in plan number 1. Now fabric requirement and cost is calculated in table number 4 applying formula number 1 and 2. As the marker efficiency is higher in plan number 3 for front, back and sleeves; definitely fabric requirement and cost will be lower than other plans. In case of neckbands, fabric requirement and cost will be lower for plan number 1.

Table3: Marker efficiency and marker length

Plan No.	*Bundles per marker*	*Marker Width*	*Marker Length*	*Marker Efficiency*
Plan-1 (for front, back & sleeves)	8 pcs (4 parts/ bundle)	66"	6 yards 16.53 inch	84.79 %
Plan-2 (for front, back & sleeves)	8 pcs (4 parts/ bundle)	70"	5 yards 35.05 inch	86.44 %
Plan-3 (for front, back & sleeves)	8 pcs (4 parts/ bundle)	74"	5 yards 22.96 inch	86.64 %
Plan-1 (for neckband)	32 pcs (single part)	58"	24.75 inch	95.17 %
Plan-2 (for neckband)	32 pcs (single part)	70"	24.75 inch	78.85 %

Table 4: Fabric requirement and cost for an order of 20,000 pieces

Plan No.	*Lay Length (inch)*	*Fabric Width (inch)*	*Fabric Weight (gsm)*	*Total Fabric Requir -ement (kg)*	*Fabric Price Per kg ($)*	*Total Fabric Cost ($)*
Plan-1 (front, back & sleeve)	234.52	68	160	4425	5.20	23010
Plan-2 (front, back & sleeve)	217.05	72	160	4350	5.20	22620
Plan-3 (front, back & sleeve)	204.96	76	160	4325	5.20	22490
Plan-1 (neck band)	26.75	60	220	150	5.80	870
Plan-2 (neck band)	26.75	72	220	181.25	5.80	1051.25

4. Conclusion

By the study we made, it is clearly understandable that the marker has tremendous influence to cut down the fabric cost for an order. If the fabric cost is minimized, then the product cost will be minimized as well. But it does not necessarily mean that; if we increase the marker width then the marker will be more efficient. We have seen an efficient marker for neckbands been made with lesser width. What the marker planner needs to do is to pick out the best marker width. Only then it can be assured that the fabric cost will be reduced.

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Author Profile

Md. Rafiqul Islam Manik[1] received MBA in Product & Fashion Merchandising from Shanto-Mariam University of Creative Technology (SMUCT) and B.Sc. (Hon's) in Knitwear Manufacture & Technology from BGMEA Institute of Fashion & Technology (BIFT) presently known as BUFT and. He worked in the merchandising department of Opex & Sinha Textile Group, Rey Tex Fashion Wears Ltd and Palmal Group of Industries. After that he worked as a faculty member in Shanto-Mariam University of Creative Technology (SMUCT). At present, he is engaged as a lecturer in Knitwear Manufacture & Technology department in BUFT. He also authored a book named "Basics of Garments Merchandising".

Ishrat Jahan[2] received M.Sc degree as well as B.Sc. degree in Clothing & Textile from Home Economics College under Dhaka University (DU). She worked in General Banking Department in Jamuna Bank Limited as an Officer. At present, she is engaged as a Lecturer in Apparel Manufacture & Technology department in BGMEA University of Fashion & Technology (BUFT).

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