A Novel Approach of 3D Based Pattern Making Block by Analyzing Positional Deviation of Draping and Drafting Method

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Abstract

As 3D-based pattern making and onscreen fit evaluation is the neoteric way of garment production which allows constructing 2D (drafting) and 3D (draping) based pattern making simultaneously. This study approaches to evaluate the deviation of major checkpoints of the upper body which have been made of conventional pattern-making methods and proposes a new Block for the Female Upper Torso. This study is carried out on a physical and virtual mannequin of equal size with identical physical properties and body dimensions. Basic Bodice blocks are developed using "Metric pattern cutting" and "The art of fashion draping" methods for Pattern Drafting and Pattern Draping respectively. Positional deviations of major checkpoints are evaluated through comparative analysis. Logical decisions are made to construct new Pattern Blocks (Back, Front & Sleeve) where both Draping and Drafting methods are justified through physical and virtual fit evaluation where CLO 3D software is used. After fit evaluation by 10 Fashion educators, it is observed that the "Metric pattern cutting" Method poses more ease allowance than "The Art of Fashion Draping" Method. The other observation of Shoulder Length, Shoulder Slope, Armhole Depth, Neck Girth, Bust Girth, Dart Placement, and Dart intake also deviated. Average values and average positions between these two systems show a better fit to generate a New Block.

Keywords: *Basic Bodice Block, Clothing Pattern, CLO 3D, Fit, Positional Deviation*

1. Introduction

Fit is an import criterion of a consumer's evaluation regarding apparel products (LAPKOVSKA, DABOLINA, and SILINA 2019). The fit is difficult to study in which the relationship between the human body and clothing is assessed to judge how well the clothing conforms to a set of requirements. These requirements or elements of fit are commonly categorized as ease, line, grain, balance, and

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set(Ashdown and O'Connell 2006). A well-fitted garment is a garment that hangs smoothly and evenly on the body, with no pulls or distortion of the fabric, straight seams, pleasing proportions, no gap, no constriction of the body, and adopts ease of movement. Hems are parallel to the floor unless otherwise intended, and the garment arm-scyes and crotch do not constrict the body (Jiang et al. 2019). According to a study, 50 percent of women and 62 percent of men cannot find a good fit in apparel (Kurnia, Swatman, and LSchauder 1998)(Chin-Man Chen 2007). Other studies have shown fit problems to be the reason for catalog return. The major suspected miss fit areas for women are the bust, waist, hip, thigh, upper arm, and back width. Many researchers used expert evaluation and analysis of anthropometric data to understand issues surrounding consumer acceptance of fit. Furthermore, the pattern-making method comparison strategy can play a vital role in signifying the major issues of fit and wellhead to develop new blocks that will be appropriate for modern technological development.

In this study, the aims are to evaluate pattern-making methods with a focus on a specific body shape and to find the common style line for developing a standard Basic block for women's wear. The standard body block will be applied on a 3d dummy for evaluation of fit in a visual context compared to two other samples through a questionnaire survey of 15 Fashion Educators. The pattern maker will follow the 2d method (drafting) as well as the 3d method (draping) to construct the basic block primarily. The basic block pattern is important because it is the base to modify for developing further stages of the pattern. The ideal basic block pattern is required to cover various body types and to apply any design and clothing type. Also, a basic block pattern is developed for efficient clothing manufacturing production.

Pattern terminology used to interpret the design solution:

Category	Issue	Technical ability	Ref.
Draping	Basic pattern set	A five-piece pattern set, consisting of front and back bodice and skirt and a long sleeve, illustrating the proportions of a particular shape or figure. Basic patterns are always traced for creating flat patterns of different types, and then further modifications are made by slash and spread techniques.	(McKinney, Bye, and Labat 2012)(Rissanen 2007)(Joseph-armstrong 2010)
	Simulation	A combination of a large range of techniques, involving mechanical simulation, collision detection, and user interface techniques for creating garments.	(Maqsood Ahmad Sandhu, Ahm Shamsuzzoha 2018)
	Working Pattern	Working Pattern is constructing conforming to the specific dimension of particular style without allowance. Working Pattern pieces are cut and marked for the common name of the pieces and the size of the garment to which they belong	(Saeidi and Wimberley 2018)(Gill 2015)
Drafting	Pattern manipulation	The act of slashing and spreading, or pivoting a pattern to modify its original form. A well-fitting basic block is used when applying either of these techniques. The new form of the pattern represents design features of the garment.	(Burns n.d.)(Mansour 2009)
	Transformational reconstruction	In this method pattern cutting is integrated into the design process as desirable design lines are drawn on an already fitted-control toile on a dress form to create the pattern.	(Saeidi and Wimberley 2018)
Fit and Balance	Ease	Additional value added with the net measurement to meet the desirable comfort, flexibility and body movement.	[3][12]

	Postural stability	Ability to control the body position in space for the purpose of movement and balance. It is necessary for maintaining a static position and for assisting body coordination in dynamic position changes.	(Brauer, Woollacott, and Shumway-Cook 2002)

2. Methods

To meet the desired result the author(s) have analyzed the two most prominent methods namely the drafting method as well as draping method into the basic block to understand the positional deviation of major checkpoints. The author(s) initiated through experimental garments of both ways contesting on fit in a visual context. The virtual sampling software (CLO 3D) is also used to review the fit through stress, strain and pressure point generation to the garments. The output of this study will be demonstrated through a block from which the women get better fit compared to any of the two methods individually.

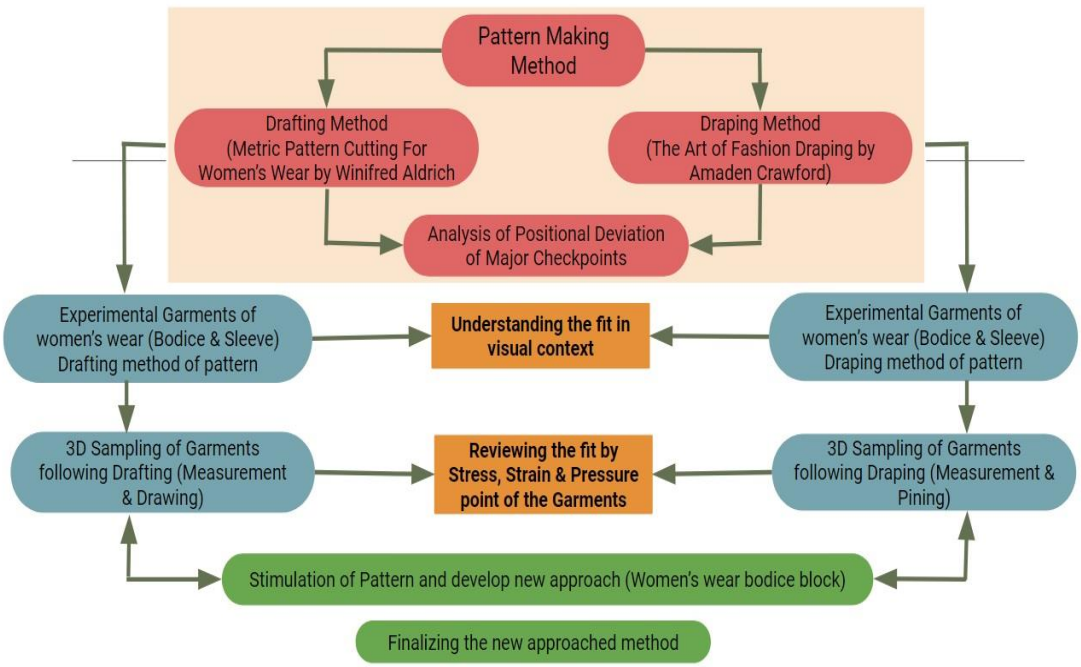

Fig. 1: Methodological frame work

3. Results

Virtual dummy creation and block simulation:

Neck: Total neck size from dummy was found 38cm and from garments was found 38cm. Distribution of neck measurement in garments; total back neck 15.5cm, total front neck 22.5cm and neck width 7.4cm. Neck drop; the back drop is 1.5cm and the front drop is 7.4cm (metric pattern cutting)

Shoulder: Shoulder length was measured 13cm for both dummy and garments. The shoulder slope is 43cm from the center, the front waist to the shoulder tip which is the same for both garments and the dummy. The shoulder angle is 22degree for dummy only.

Bust: Total bust measurement 89cm for dummy but in garments total bust 99cm, added 10 cm total ease with 89cm (dummy). The distribution of the total bust is 51cm on the front bust arc and 48cm on the back arc.

Arm-scye Measurement: Front body width 22.9cm and back body width 23.5cm.

Waist: Total waist measurement is 73cm from the dummy and 75.2cm from garments, thus 2.2cm ease is observed. The waist shape added a 7cm dart on the back side, which is divided by 2 (3.5cm+3.5cm). 9cm dart is also added on the front side, which is divided by 2 parts (4.5cm+4.5the cm). The distribution of front and back waist measurement is found 37.2cm and 38cm respectively.

Waist Dart Position: Center front waist to princess line distance is 7.2cm which is considered as the front dart position whereas from metric pattern cutting system dart position is 10.5cm from garments where 11cm is found from dummy. The back bust dart position from garments is 11cm where 7.5cm is found from dummy from the center back to the princess line.

Side Seam Length: 17.2cm is found on both the dummy and garments.

Dummy Measurement/Physical &Virtual Reference: SE 503510577		
S/ L	**Point to measure (POM)**	**Value (CM)**
1	Total height	175.26
2	Bust circumference	89
3	Neck base circumference	38
4	High hip	88
5	Low hip	97
6	Across shoulder (curvy linear)	39.80
7	Inseam height	79
8	Thigh circumference	55
9	CF neck to waist	37
10	CB neck to waist	41
11	CB neck to wrist (arm)	84
12	Biceps circumference	29.70
13	Hand	16
14	Total rise	69.50
15	Head	52
16	Hips to apex	26.70
17	Waist circumference	72

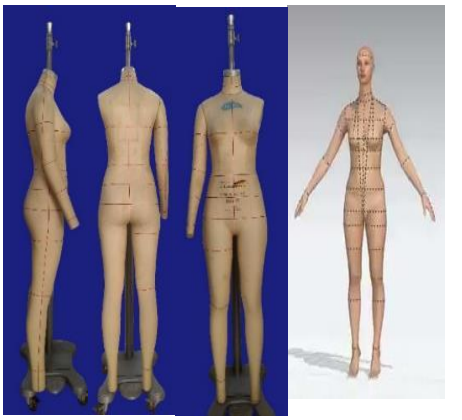

Fig. 1: Dummy for experiment physical & virtual. Reference: SE 503510577

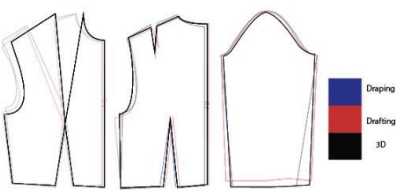

Fig. 2: Block simulation.

New block creation processes:

The authors developed a new pattern based on the technique of metric pattern cutting system and draping system. Here the individual part of the body is based on the bust measurement & the size of each dart has been calculated from the bust and waist measurements. Waist dart is calculated by the formula: (bodice - Waist/2 + 2), where 2cm is the amount of ease added. Below reference tables and drawings can give clear knowledge for pattern drafting -

B	Body Width B/2+4	A - BL B/12+14.88	Back Width B/8+7.47	BL-B B/5+7.2	Chest Width B/8+10.07	B/32	Front Neckline Width B/24=3.19=⊙	Front Neckline Width⊙+0.4	Back Neckline Width ⊙+0.6	Front Shoulder Darts (B/4-6.25)°	Back Shoulder Dart B/32-1.58
89	48.5cm	22.3cm	18.6cm	25cm	21.2cm	2.78	6.9cm	7.3cm	7.5cm	16cm	1.2cm

Quick reference table of measurements for different parts of the body:

Waist dart measurement - Quick reference table:

Total darts volume 100%	e	c	a
	33.33%	23.81%	42.86%
10.5	3.5	2.5	4.5

The construction of new Block:

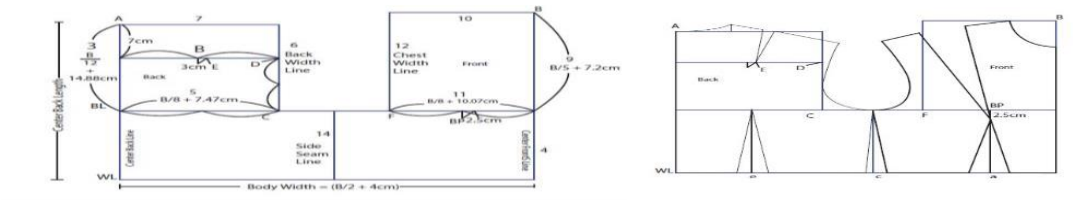

Fig. 4: Proposed Block drafting method

Ease distribution to the body and sleeve

The design of the pattern according to the size is the initial step of the garment manufacturing process and ease becomes a crucial factor(Seock, Yoo-Kyoung; Norton 2007). The following graph illustrates the yellow mark i.e. new approach ease remains in-between blue & red which stands for draping & drafting. These new approaches using CAD in pattern development enable a fitted shape, which more accurately reflects the body surface.

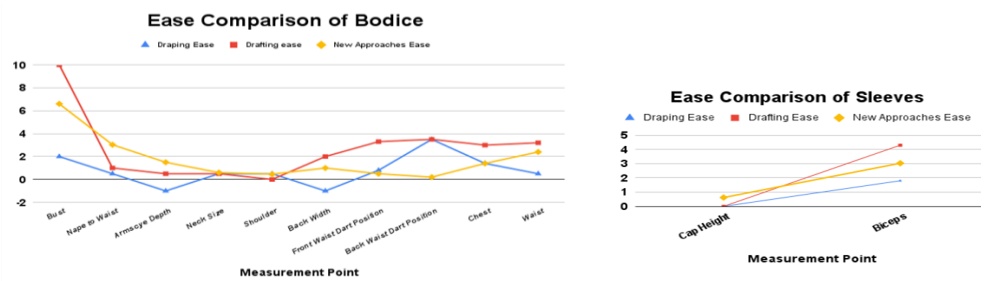

Fig. 5: Ease distribution graph.

4. Discussion

Stress Mapping: Stress refers to how much pressure is generated on the body by garments and vice versa when garments adorn to a body(Jariyapunya and Musilová 2020). There is a color bar at the right side of the frame where blue represents minimum stress and red represents the maximum stress. The unit of stress is KPA. Drafting (1) express the stress generated randomly to the unexpected area of garments. Where draping (2) also shows unusual stress but the new approach (3) shows stress generated in expected location namely armhole, shoulder joining line, overarm seam line, bust area as well as bicep. The blue doted area refers the functional area of garments.

Fig. 6: Stress mapping comparison

Strain Mapping: Strain refers to how much the garment is stretched when being worn to the body(Jariyapunya and Musilová 2020). For instance, if the fabric of a garment is full of hexagonal shape when the garment is in 2D condition the hexagonal shape will remain in original stage but when it becomes stretched the shape will be distorted. This distortion tote refers as strain. The drafting image shows (1) the strain appears all around the body where draping (2) has also strain unexpected area but the

new approach (3) shows strain appears in the expected location rather than all around according to requirement.

Fig. 7: Strain mapping comparison

Pressure Point: Due to stress & strain pressure points are generated in the garments. Generally, the pressure point should be created into the functional area where body proportion allows the seam line construction such as shoulder blade, neck girth, back width, bust, and upper arm seam line(Jariyapunya and Musilová 2020). Here the drafting image (1) shows a pressure point generated all around the body due to inadequate stress & strain whereas draping (2) also unexpectedly a pressure point created to the required the place as per necessity of body function.

Fig. 8: Pressure point comparison

5. Conclusion

The process of pattern construction develops the pattern shape through the plotting of a geometric outline, by defining points joined by straight or curved lines, within a drafting system. The draping also considers the body dimension as well as the posture ability to consume the ease, which ultimately reflects to the fit and balance of the

garment. The major checkpoints (Shoulder Length, Shoulder Slope, Armhole Depth, Neck Girth, Bust Girth, Dart Placement, and Dart Intake) of the female upper torso determine the pressure, stress and strain to a garment, which influence the dimensional stability of the garment also. Proper distribution of ease to the major check points minimize the stress introduce accurate strain and generate standard pressure point which helps to be dimensionally stable and adequate balance of a garment. Our new approach obviously meet the minimal range of ease to the construction compare to the two prominent method and will be the standard of fit to the formation of a garments. This research suggests that to provide well-fitting and functioning garments requires not only determination of dimensions of the wearer, but the definition of the levels of ease, which control pattern dimension also. The model proposed in this paper provides an indication of how pattern dimensions can be viewed to enhance understanding the fit through virtual simulation of the garment.

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