Original Contribution

FACILITATING METHODOLOGIES FOR THE DESIGN OF COLLARS WITH LAPELS AND SHAWL COLLARS WITH DIMENSIONS, EQUAL OR LARGER

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ABSTRACT

The diversity of models in the design of collars with lapels and shawl collars depends on the following: shape of collar curves and the lapel (shawl collar), shape and size of collar and lapel, collar height, neckline depth, shawl collar, break point and the extension for buttons. A study of the design of the collars with lapels and shawl collars with various dimensions has been made based on the methodologies for constructing collars with lapels and shawl collars with dimensions relative to the shoulders. There was no correlation between design and constructional elements. This observation provided a new basis for using multiple linear progression to obtain an effect of collar slope on the following interactions: neckline depth, shawl collar, break point, and button extension. Further study was made with the aim of simplifying the formula. Thus the depth of the neckline, shawl collar, break point, and the extension for buttons showed the roll line and its slope with a defined slope of collar by the angle on slope of the roll line.

Key words: design, constructing, collars with lapels, shawl collars

INTRODUCTION

The last fashion trends (season fall-winter 2006-2007) introduced ladies' garments with collars having lapels and shawl collars of various dimensions relative to the shoulders Often clothes with this kind of collar stay only in collection of fashion designers and they are manufactured rarely because most methodologies for design construction are complicated or faulty.

The diversity of models in the design of collars with lapels and shawl collars depends on the following interactions: geometrical mode of the curves, forming the collar and the lapel (shawl collar), geometrical form and dimensions of the collar and the lapel (shawl collar), height of the collar's stand, the depth of the neckline, the lapel's (shawl collar) height (break point) and the extension for buttons.
Articles (2) and (3) present full methodologies for easy and accurate design of the collars

with lapels and shawl collars in various dimensions on the basis of transformation of methodology (4) and traditional modes of constructing this kind of collars with small dimensions, and investigation of the interaction of the design and constructional elements. These elements determine the slope of collar on the bodice. Full systematic is effected with a formula for defining the slope of the collar, which reflects the interaction of the depth of the neckline, the lapel's (shawl collar) height (break point) and the extension for buttons.

This paper presents a new study, which is made for facilitation of the formula. The depth of the neckline, the lapel's (shawl collar) height (break point) and the extension for buttons locate the roll line and its slope. The new formula is found, which will replace the depth of the neckline, the lapel's (shawl collar) height (break point) and the extension for buttons with the angle on slope of the roll line.

METHOD USED

The analysis of the construction shows that setting of the back on the front in system M. Müller + Sohn (4) defines the slope of the collar. Therefore the main problem in the transformation on methodology (4) for easy

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constructing is searching for other ways for assigning the slope.

On **Figure 1**: The segment 1÷2 defines the width of the extension for buttons. 2÷3 defines the lapel's (shawl collar) height. 4 is the point of intersection of the neckline and shoulder in the front (after extra depth of neck line). The arc 4÷5÷6 is drawn by center 3 and radius distance 3÷4. The distances 4÷5 = 5÷6 = 2,0-2,5 cm are the height of the collar's stand by shoulder. 7 is the point of intersection of the neckline and middle line and 8 is the point of intersection of the neckline and shoulder in the back (after extra depth of neck line). Line 7÷9÷10 is a continuation of the middle line in the back. 7÷9 and 9÷10 are equal to the height of the collar's stand by middle line in the back. 7÷9 = 9÷10 = 4÷5 + 0,5 = 5÷6 + 0,5. Line 8÷11÷12 is parallel to line 7÷9÷10. The segments 8÷11 and 11÷12 define the height of the collar's stand by shoulder. 8÷11 = 11÷12 = 4÷5 = 5÷6. The sectors 7÷8÷11÷9 and 9÷11÷12÷10 form the collar's stand on the back. The back lies on the front as distance 6÷12 is 0-0,5 cm and the end point of the back shoulder is laid on the front shoulder. (4)
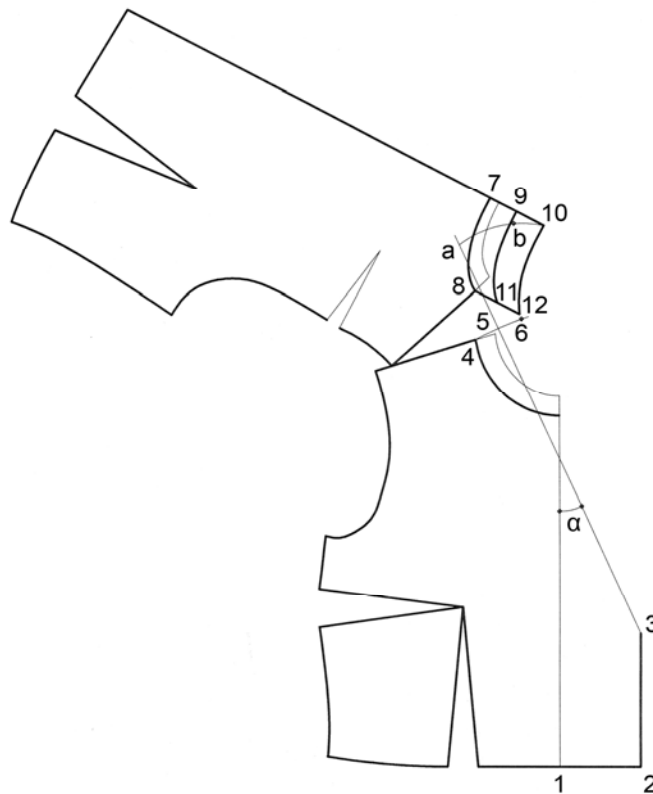

Figure 1: Defining of slope of collar. Drawing of arc a÷b÷10

The problem is solved through similarity with the construction of collar with lapel and shawl collar with smaller dimensions, where the slope of collar is defined with arc with radius – length of neckline in the front and center - point of intersection of the neckline and the front shoulder. On **Figure 1**: After setting the back on the front side, the points 3 and 5 are connected with straight line. Arc a÷b÷10 is drawn with center point 6 (6 is copy of point 4 toward 3÷5) and radius 6÷10. Distance 10÷b is equal the height of the collar by middle line in the back – 10÷b = 7÷9 = 9÷10. The length of the arc a÷b÷10 defines the slope of the collar. (2-3).

In (2) and (3) the length of the arc a÷b is defined with the help of multiple linear regression by interaction between the length of the arc – the dependent variable Y and factors (independent variables X_i) for assigning the slope of the collar: the width of the extension for buttons – 1÷2 – X_1, the depth of the neckline – X_2, the lapel's (shawl collar) height from the waist – 2÷3 – X_3 (**Figures 1 and 2**) – formula (1):

(1) $Y = b_0 + b_1 . X_1 + b_2 . X_2 + b_3 . X_3$

Y is a dependent variable, X_1, X_2, X_3 – independent variables, b_0 – constant, b_1, b_2, b_3 – slopes.

In the study in (2) and (3) formula (1) accepts mode (2):

(2) $Sc = b_0 + b_1 . Eb + b_2 . Dn + b_3 . H$

Sc is slope of the collar, Eb – width of the extension for buttons, Dn – depth of the neckline, H – lapel (shawl collar)'s height from the waist.
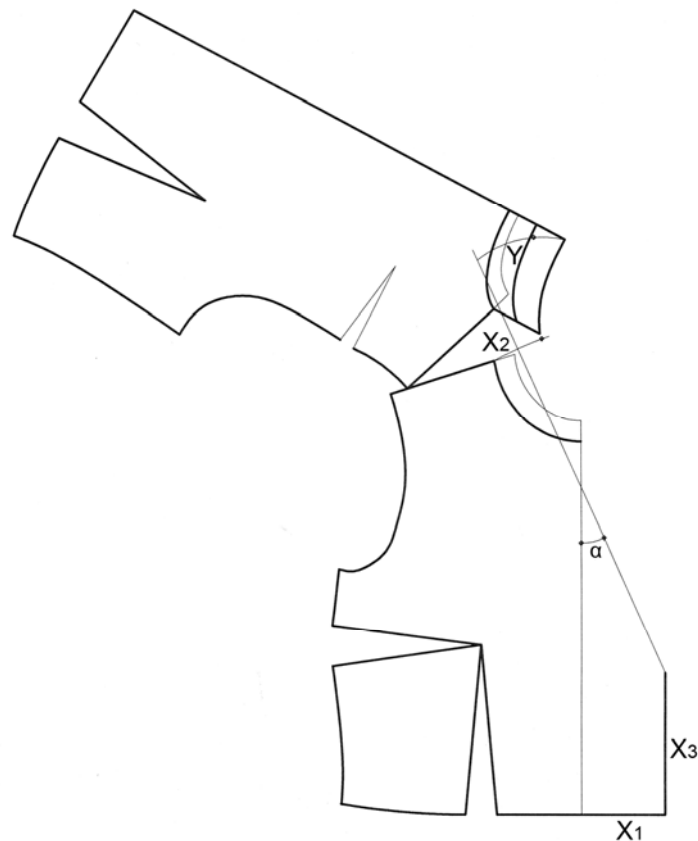
Figure 2. *Dependent and independent variables*

The present study looks for the exchange of formula (2), as width of the extension for buttons, depth of the neckline, lapel (shawl collar)'s height from the waist, which define the slope of roll line, are replaced with α – angle between roll line and vertical line of the front middle (figures 1 and 2) – formula (3):

(3) $Sc = b_0 + b_1 . tg\alpha$

The construction, presented on **Figures 1 and 2** is drawn for values of independent variables – Dn – 0; 2,0; 4,0 cm, for combinations between Eb and H – Eb = 0 cm, H = -15,0 cm; Eb = 5 cm, H = 0 cm; Eb = 10,0 cm, H = 25,0 cm for ladies' jackets with sizes of breast – 88 and 92 cm.

The linear regression is made with the help of the software products STATISTICA 6.0 (1). The constructions are drawn with CAD system KOMPAS-3D LT V8 and values of angle α are measured after drawings.

RESULTS

After statistical analysis the results are: $b_0 =$ 4,21; $b_1 = 4,75$ with high level of statistical significance $p \leq 0,000$, R-square = 0,78549 and Standard Error of estimate = 0,4617 . The values of p-level, R-square and Standard Error of estimate show correctness of the regression model (3)

Formula (3) acquires mode (4) on the base of the linear regression:
(4) $Sc = 4,2 + 4,75 . tg\alpha$

METHODOLOGIES

Geometrical drawing in the methodologies is the same as presented in (2-3).

First methodology, presented on **Figure 3**, is the same as the way for constructing of collars with lapels and shawl collars in smaller dimensions and is used for collars with straight roll line. The segment 1÷2 defines the width of the extension for buttons. The segment 2÷3 defines the lapel's (shawl collar) height from the waist. The point 4 is the point of intersection of neckline and shoulder in the front (after extra depth of neck line). The distance 4÷5 = 2,0-2,5 cm is the height of the collar's stand by shoulder. 3÷5 is roll line. Distance 4÷6 is equal to the length of the neckline on the back. The arc 6÷7÷8 is drawn by centre point 4 and radius 4÷6. The distance 6÷7 on the arc is the slope of the collar, defined by formula (4). The distance 7÷8 is the height of the collar's stand by back middle. 7÷8 = 4÷5 + 0-0,5 cm. Point 8 and front neckline are connected with supple curve, defining line of joining of collar with neckline. A line is drawn in point 8,

perpendicular to curve of joining of collar with neckline. The new straight line defines the middle of collar. Distance 8÷9 on the collar's middle line defines the height of the collar's stand by back middle - 8÷9 = 7÷8. Distance 9÷10 defines the weight of the collar

by back middle. Point 11 is the mirror image of the end point of shoulder by roll line 3÷5. The line of the collar edge is drawn trough or right point 11 and depends from the design project.
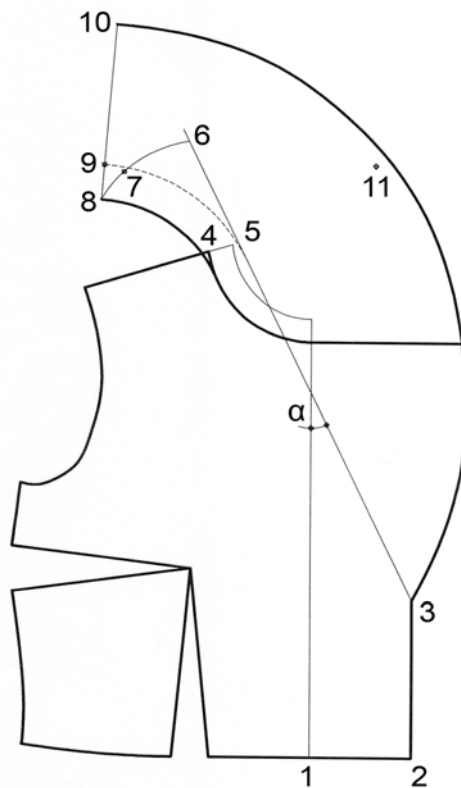

Figure 3. *Design of collar with straight roll line*

The second methodology, presented on **Figure 4**, is used for collars with curved roll line. The segment 1÷2 defines the width of the extension for buttons. The segment 2÷3 defines the lapel's (shawl collar) height from the waist. 4 is the point of intersection of neckline and shoulder in the front (after extra depth of neck line). The arc 4÷5÷6 is drawn by center point 4 and radius 3÷4. Distances 4÷5 = 5÷6 = 2,0-2,5 cm define the height of the collar's stand by shoulder. 3÷5 is roll line. The arc 7÷8÷9 is drawn by centre point 6 and radius, equal to the length of the neckline on the back. Distance 7÷8 on the arc is the slope of the collar, defined by formula (4). The distance 8÷9 is the height of the collar's stand by back middle. 8÷9 = 4÷5 + 0-0,5 cm. Points 6 and 9 are connected with supple curve, defining line of joining of collar with back neckline. A line is drawn in point 9, perpendicular to curve 6÷9. The new straight line defines the middle of collar. Distance 9÷10 on the collar's middle line defines the height of the collar's stand by back middle - 9÷10 = 8÷9. Distance 10÷11 defines the

weight of the collar by back middle. The line of the collar edge is drawn trough or left the end point of shoulder and depends from the design project. Points 3 and 4 are connected with supple curve, forming front neckline. Points 3 and 5 are connected with supple curve, forming roll line. Points 3 and 6 are connected with supple curve, forming line of joining of collar with front neckline.

CONCLUSION

The slope of collar, an important constructional element in design of collars with lapels and shawl collars with various dimensions, is mathematically defined with formula (4).

The use of formula (4) facilitates additionally the methodologies, presented in (2-3).

Formula (4) and easy methodologies for design are prerequisites for creating model variances. The modes are compatible for design with both traditional hand drawing and CAD systems.
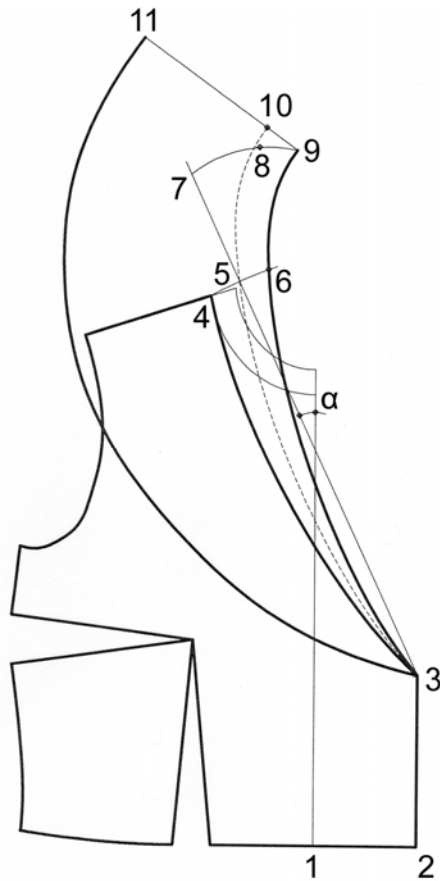
Figure 4. *Design of collar with curved roll line*

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