

PATTERN CONSTRUCTIONS OF MATERNITY WEAR

Petra KOMÁRKOVÁ, Blažena MUSILOVÁ

Technical University of Liberec, Faculty of Textile Engineering, Department of Clothing Technology, Liberec, Czech Republic

petra.komarkova@tul.cz, blazena.musilova@tul.cz

Abstract

Research of maternity wear pattern construction reacts to present increasing demand for this type of clothes. First of all the procedure of taking body measurements is determined in relation to anatomical changes of female body during maternity. Anthropometric data is processed by statistical methods and correlation between body measurements is analysed. Results are applied into metric pattern construction of maternity clothes. Results are applied as for determination of pregnant women types as for input construction parameters setting that respect body proportion of pregnant women in case of different types of maternity wear.

Key words: somatometric research, pattern construction, measurement in pregnancy

1. Introduction

Pregnancy or in medicine term gravidity takes forty weeks, three trimesters, nine calendar months or ten lunar months. A body start to change after impregnation immediately. A body changes both physically see **Fig. 1** and physiologically.

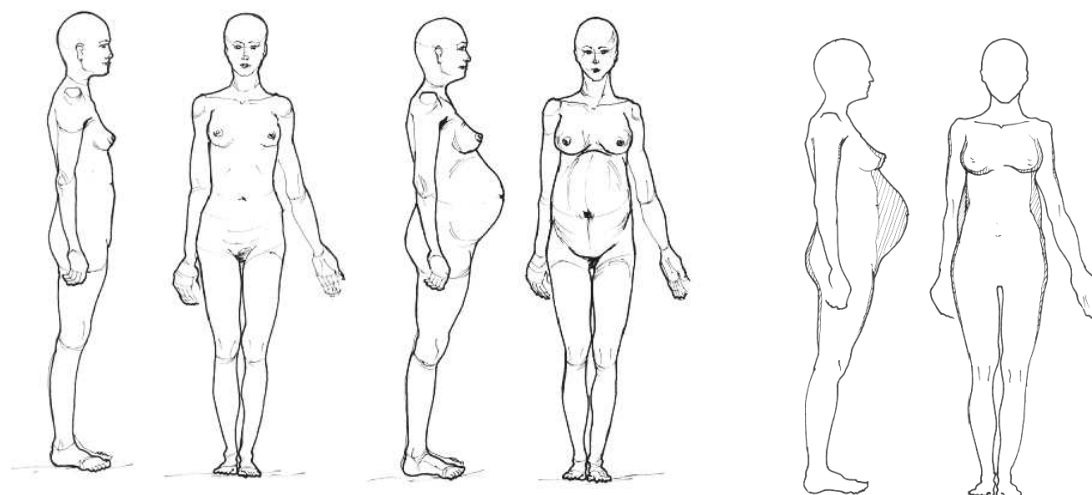


Fig. 1 Comparison of woman proportions before and in the end of pregnancy

Proportions of woman body before pregnancy and in the end of pregnancy (draw in **Fig. 1**) represent the biggest shape changes. The changes come in girth proportion only. Woman is sexually and growth adult in gestation period and for that reason height proportion does not change. In pregnancy period the changes of proportion are in regions: thoracic area, abdominal area, gluteal area, femoral area and arm area. The biggest change is in abdominal region.

A typological characteristic of body according to traditional typology (e.g. Manouvier, Kretschmer, Mathes, Škerleje) before, during and after pregnancy remain unchanged.

2. Selection of body measurements for characteristic of changes during pregnancy

2.1 Static body measurements

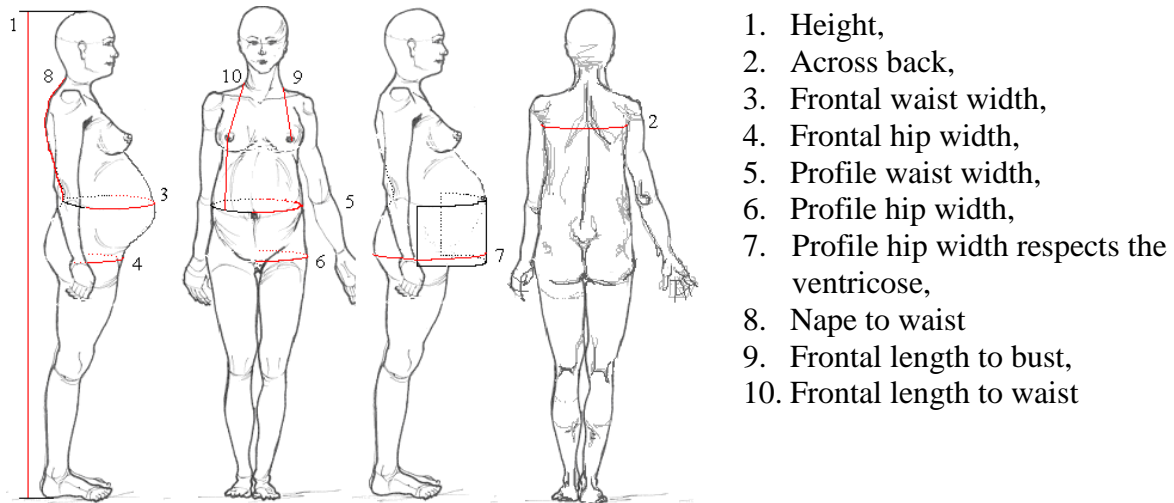


Fig. 2 Body measurements – measured during pregnancy

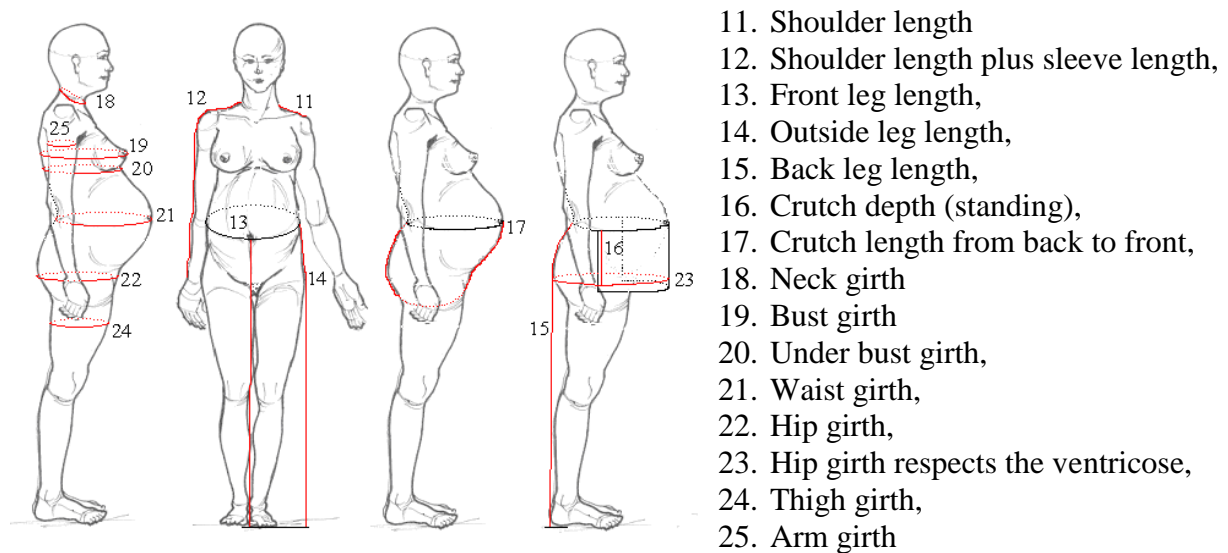


Fig. 3 Body measurements – measured during pregnancy

2.2 Dynamic body measurements

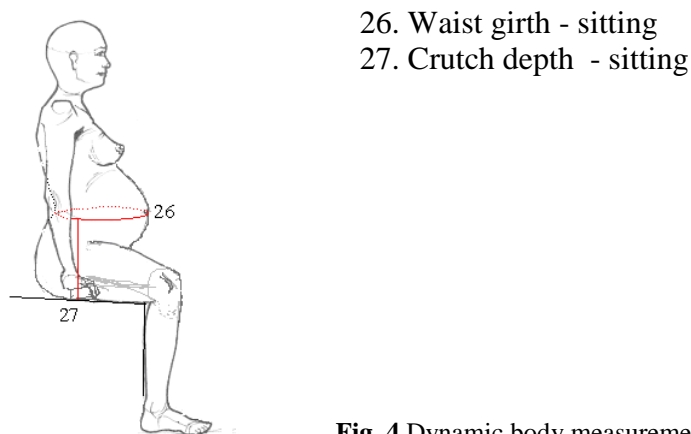
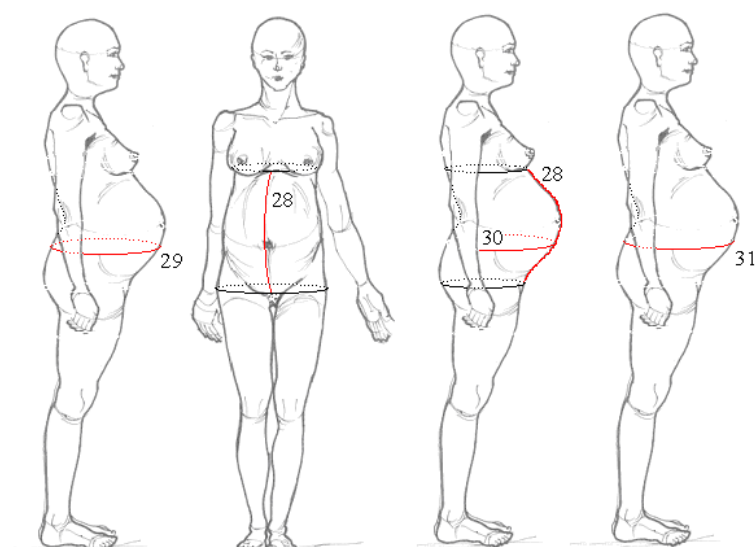


Fig. 4 Dynamic body measurements - sitting

2.3 Other body measurements



- 28. Front length of ventricose,
- 29. Girth of biggest ventricose,
- 30. Frontal ventricose,
- 31. Profile ventricose

Fig. 5 Other body measurements

3. Statistical measured data evaluation

Aggregate of 30 women was base for somatometric measurement of pregnancy women population. We measured basic body measurements of these women before pregnancy and in the end of pregnancy period when the biggest changes of proportions come through. This data doesn't present in this paper for big data volume reason.

For capacitive reasons the only representative parts from the whole result file from statistical data evaluation are presented in this paper; specifically the dependences of body measurements on weight gain which have direct influence on trunk block pattern construction. See Fig. 6, Fig. 7, Fig. 8, Fig. 9. Second part of this paper deal with this type of pattern construction.

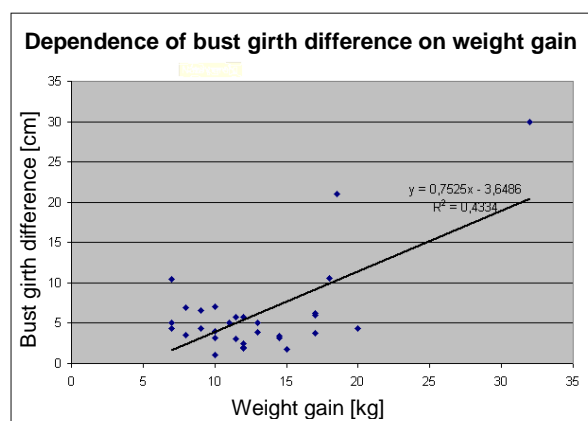


Fig. 6 Dependence graph of bust girth difference on weight gain

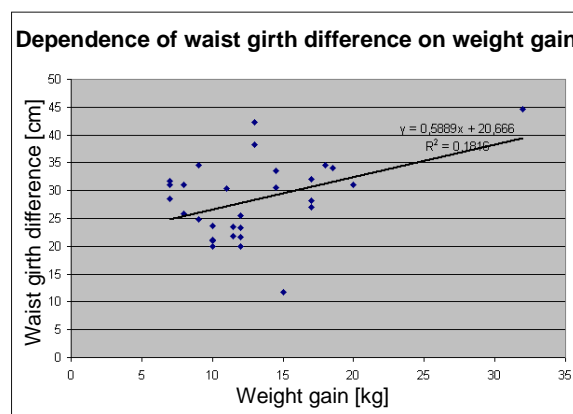


Fig. 7 Dependence graph of waist girth difference on weight gain

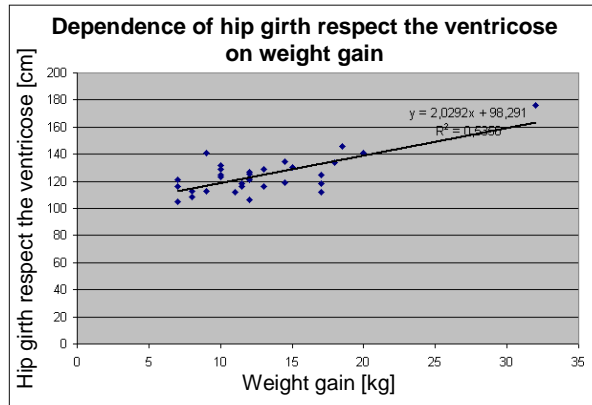


Fig. 8 Dependence graph of hip girth respects the ventricose on weight gain

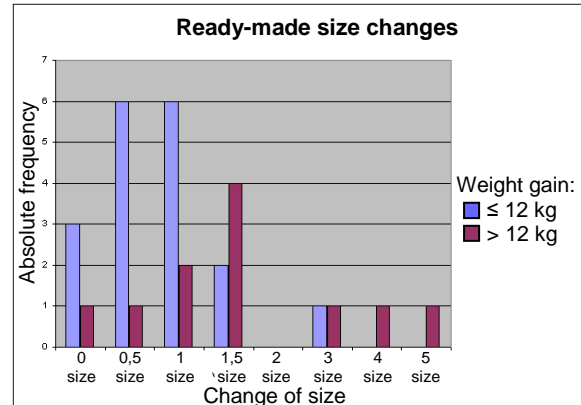


Fig. 9 Histogram of ready-made size changes (on the basis of metric measurement for increase in weight up to 12 kg and over 12 kg)

3.1 Dynamic effect result

Dynamic effect of body measurements change in part of waist is very important for pattern construction of pregnancy women. Clothes for pregnancy women must be comfortable for weaver in abdominal region. The average result from statistical data evaluation is **5,14 cm** and it is possible to use it in pattern construction as an allowance for looseness for inelastic textile material. Average dynamic effect for elastic textile material depends on degree of material elasticity.

4. Pattern construction for pregnant women

Used pattern construction method is based on Müller & Sohn pattern construction method. The body measurements of concrete proband with weight gain up to 12 kg are used for pattern construction.

4.1 Pattern construction of basis blouse block pattern for pregnant women

Statistical comparison of measured body measurements: bust girth (bg) and waist girth (wg), before pregnancy and in the end of pregnancy show dependence of change of these body measurements. The changes of these body measurements are dependent on weight gain. An increase of these body measurements is approximately symmetric.

Difference of bust girth (bg) is **6,5 cm**, it is **6,3%** from original bust girth. This difference is calculated by method of selective arithmetical average from measured measurements. Difference 6,3% is pregnancy allowance added to total bg, so **0,063bg** (0,063 from bust girth).

Changes in measurements calculation:

Across back - **ab**, armhold width - **aw**, front part width – **fpw**, neckline width - **nw**:

- $1/2 ab = 1/8(bg + 0,063bg) + 5,5$
- $aw = 1/8 (bg + 0,063bg) - 1,5$
- $fpw = 1/4 (bg + 0,063bg) - 4$
- $nw = 1/10 \text{ from } 1/2 (bg + 0,063bg) + 2$

In next step of pattern construction we add allowance for looseness to calculated measurements (according to determined rules). This pattern construction is made for inelastic textile material.

Next changes in pattern construction:

- The position of bust line point (constructional line H7H6); change of formula $1/10 (bg + 0,063bg) + 1$.
- The position of front shoulder point, distance is measured along the circle (N5N4') and dimension is mark out according to formula $1/20 (bg + 0,063bg) - 1$ to 2.

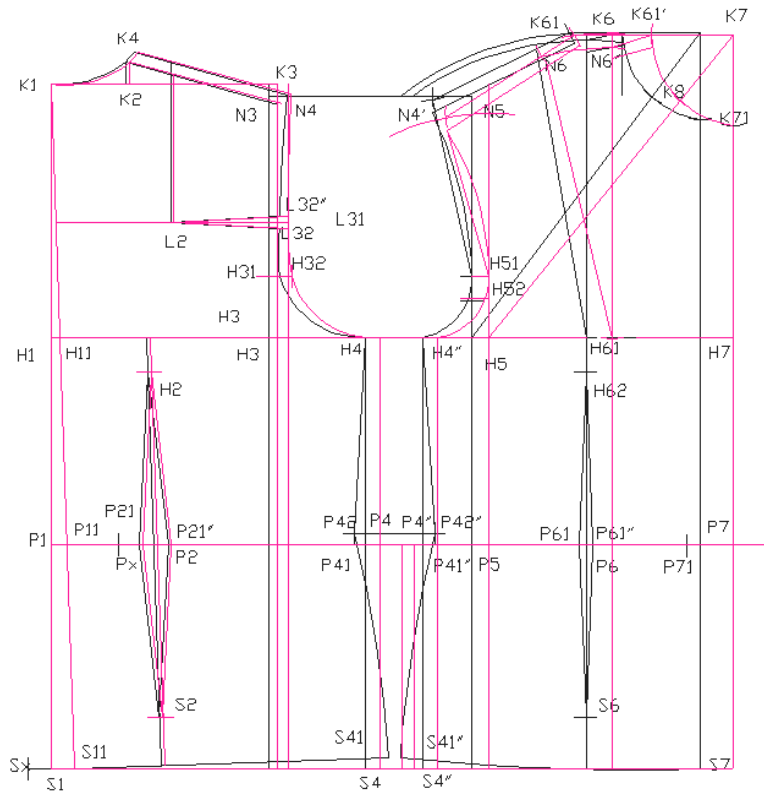


Fig. 10 Representation of measurement changes in basic pattern construction of woman blouse (black) and blouse for pregnant women (red).

4.2 The control of blouse measurements on bust line

The control of blouse measurements on bust line means to remeasure in blouse pattern the distance H1H4 in back blouse and distance H4'H7 in front blouse. The sum of these distances is $\frac{1}{2} bg$ with allowance for looseness. This allowance for looseness is the same for pattern construction of blouse for pregnant women and in addition to that, this allowance is added by pregnancy allowance. A pregnancy allowance for $\frac{1}{2} bg$ is $\frac{1}{2} 0,063 bg$.

Pregnancy allowance for bg (17,76 cm) minus allowance for looseness for basic pattern (12,044 cm) equal dimension 5,726 cm. Consequently the pregnancy allowance for bust girth $0,063 bg$ (5,63 cm) is completed.

4.3 The control of blouse measurements on hip line

Body measurement hip girth of women is different before pregnancy and during pregnancy. Difference of hip girths (hg) is **5,64 cm**, it is **5,25%** form original hip girth. This difference is calculated by method of selective arithmetical average from measured measurements. Difference **5,25%** is pregnancy allowance to total hg , so **0,0525 hg** (0,0525 from bust girth).

Pregnancy allowance for hg (21,7064 cm) minus allowance for looseness for basic pattern (15,9954 cm) equal dimension 5,711 cm. Consequently the pregnancy allowance for hip girth $0,0525 hg$ (4,7775 cm) is completed.

4.4 The control and design editing of blouse measurements on waist line

Body measurement waist girth of women is considerably different before pregnancy and during pregnancy. Difference of waist girths (wg) is **28,535 cm**, it is **37,04%** form original waist girth. This difference is calculated by method of selective arithmetical average from measured measurements.

Difference **37,04%** is pregnancy allowance for waist girth. But it is not possible to add this pregnancy allowance to waist girth because the measurement change in area of waist line during pregnancy is not symmetrical for back blouse and front blouse. While the change for back blouse is imperceptible, waist line in front blouse change a lot.

Profile view of pregnant woman show that the back in waist line keep bent and abdomen is really ventrosity. Frontal view show a noticeable waist loss.

Back blouse must remain shaped. For that reason the back dart is retained in full width as in basic pattern construction. The darts on front and side blouse are leaved out (See Fig. 11) but it is not sufficient for fulfilment of pregnancy allowance in waist region.

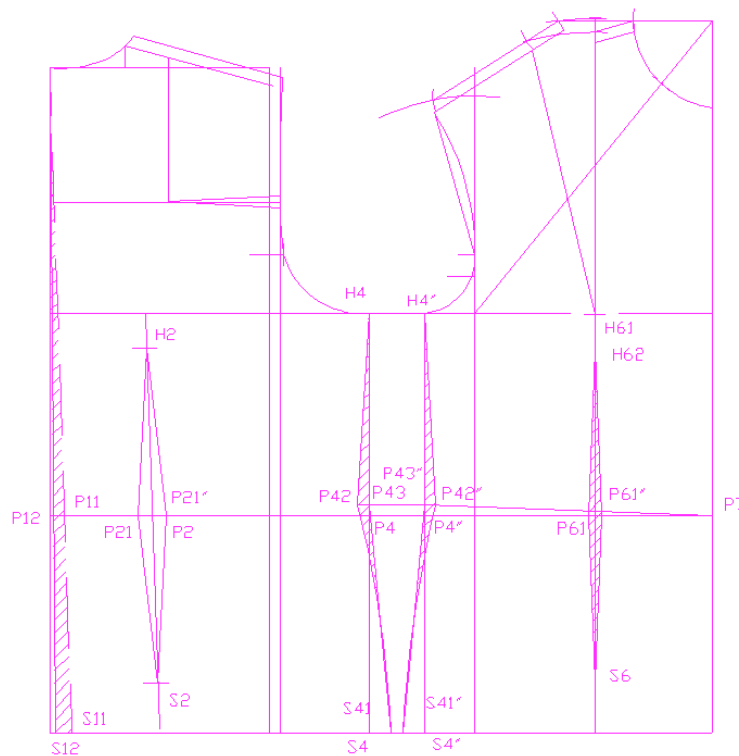


Fig. 11 The representation of front and side darts leaving out in pattern construction of woman blouse for pregnant women

The rest of this allowance is too big still. It is not possible to simply add to front centre line in waist region. Then we use the method that divide the pregnancy allowance into several parts, specifically four parts. First part – **30%** is looseness from leaving out of front and side darts and from loosening of back centre line (possibly reduction of back dart). See Fig. 11. Second part – **26%** is added to front centre line. New front centre line originate in this way and that is elongated to hip line. Last two parts – **44%** originate from two design pattern modifications of front blouse. Front blouse in waist line is widened twice on **22%**. See Fig. 12

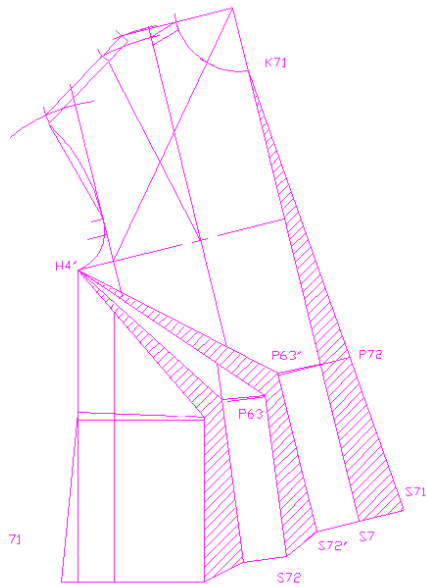


Fig. 12 Front blouse widening in waist line, design modification of basic block pattern for pregnant women

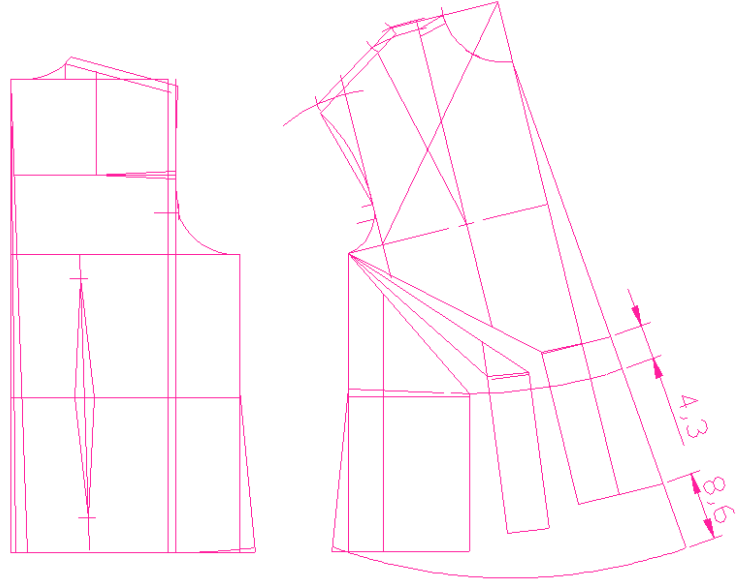


Fig. 13 Final styling modification of blouse pattern construction for pregnant women

The next modification in pattern construction of blouse for pregnant women is change of garment length. The change of garment length is consequence of body measurements changes in abdominal region, not only in waist but also in length. Body measurement - Front length of ventricose describe this change. See Chapter 2.3.

Pattern construction of sleeve for pregnant women is identical with original pattern construction and for that reason will not solve in this paper.

4.5 Pattern construction of blouse for pregnant women with weight gain over 20 kg

Pattern construction for group with weight gain over 12 kg is presented for comparison. There are used for pattern construction the body measurements of concrete proband with weight gain 20 kg.

The difference is in spreading of first part – 30% of pregnancy allowance in waist line. Front and side darts leaving out and loosening of back centre line is same, but change is in reduction of back dart. Next change is selection of bigger extension of front centre line within the bounds of interval – 10,8 cm. See Fig. 14

5. Pattern construction of trousers basic pattern for pregnant women

Pattern construction for bottom part of body – trousers was solved under the research of pattern construction for pregnant women. But in this paper is not space for presentation of this research part.

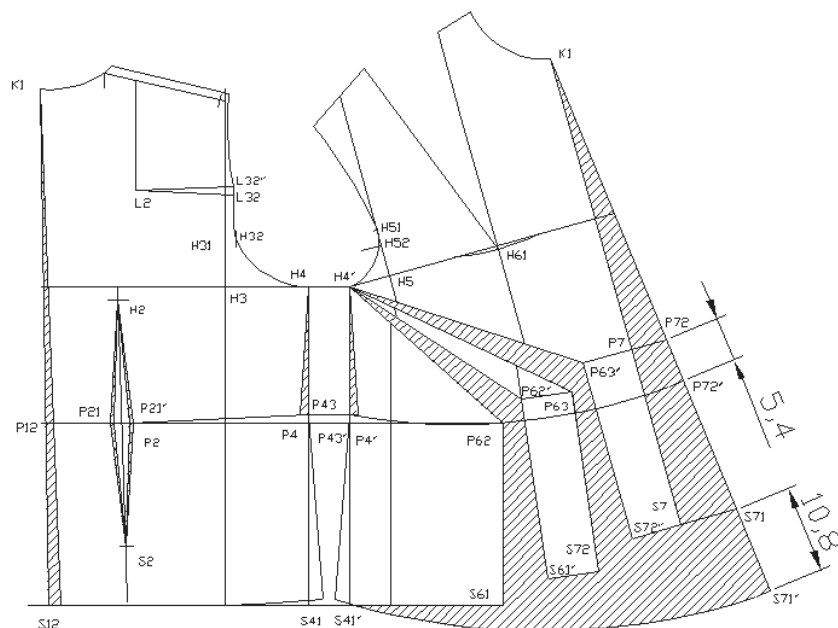


Fig. 14 Pattern construction of blouse for pregnant women with weight gain over 12 kg

6. Conclusion

The principle of pattern construction of clothes for pregnant women is to put in changes related to pregnancy into standardly used method of pattern construction.

In accordance with a typology and measured body measurements the changes in girth proportion comes due to the pregnancy. The pregnancy allowance was defined, it is average difference of body measurements that are needed for pattern construction. This pregnancy allowance was included in pattern construction calculation, it was added to total body measurements, with exception of waist girth. The pregnancy change is not symmetrical for the whole waist girth. The solution of this problem is to divide this allowance to some parts, extra for front and extra for back.

Pattern constructions for pregnant women were split into two categories according to results from statistical data analysis. These categories are in compliance with weigh gains and projected typology. The pregnancy allowances were evaluated for each category specially.

This version of pattern construction for pregnancy women can be recommended for apparel production because it respect total change of body proportions during pregnancy.

7. References

1. Čihák Radomír. *Anatomie I.*. Avicenum. Praha, 1987
2. ČSN 80 0090. *Metodika měření tělesných rozměrů mužů, žen, chlapců a dívek.* Praha. Český normalizační institut, 1993.
3. Nová Tereza. *Oděvy pro těhotné ženy.* Diplomová práce. Liberec. 2009
4. Zrzavý J. *Anatomie pro výtvarníky*, Vydav. 1. Praha, Avicenum, Praha 1977
5. Meloun Milan, Militký Jiří.: *Kompendium statistického zpracování dat.* Academia. Praha, 2002. ISBN 80-200-1008-4

Acknowledgements

The authors would like to thank for supporting of the EU project InCoTex "Innovation centre for customer-oriented, industrial textile products".