ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 5, Issue 5 , May 2018

Structure's Pattern Effect on V-Bed Knitting Machine

Musaeva M. M,Khankhadjaeva N. R.

Assistant, Tashkent Institute of Textile and Light Industry, Uzbekistan.
Doctor of Technical Sciences, Dostent, Tashkent Institute of Textile and Light Industry, Uzbekistan.

ABSTRACT: In this article **r**esults of analyses show that offered structures have some advantages to compare to basic structure. On the aim of resource economy technology they give a possibility of raw material expenditure decreasing 2,4%. There is not lost strength parameters. Structures consist of normal rib loops, plain structure loops, cardigan stitches and elongated loops.

KEYWORDS: textile, knitting structures, rib loops, cardigan stitches and elongated loops, flat knitting machines, surface and volume density, properties, elongation.

I. INTRODUCTION

Typical structures knitted on flat machines. The simplest rib fabric is 1x1 rib that is knitted on flat machines. The first rib frame was invented by *JedediahStrutt*of Derby in 1755, who used a second set of needles to pick up and knit the sinker loops of the first set. It is now normally knitted with two sets of latch needles (fig.1). Rib has a vertical cord appearance because the face loop wales tend to move over and in front of the reverse loop wales. As the face loops show a reverse loop intermeshing on the other side, 1x1 rib has the appearance of the technical face of plain fabric on both sides until stretched to reveal the reverse loop wales in between. 1x1 rib is production of by two sets of needles being alternately set or gated between each other. Relaxed 1x1 rib is theoretically twice the thickness and half the width of an equivalent plain fabric, but it has twice as much width-wise recoverable stretch. In practice, 1x1 rib normally relaxes by approximately 30 per cent compared with its knitting width. 1x1 rib is balanced by alternate wales of face loops on each side; it therefore lies flat without curl when cut. It is a more expensive fabric to produce than plain and is a heavier structure; the rib machine also requires finer yarn than a similar gauge plain machine. Like all weft-knitted fabrics, it can be unroved from the end knitted last by drawing the free loop heads through to the back of each stitch. It can be distinguished from plain by the fact that the loops of certain wales are withdrawn in one direction and the others in the opposite direction, whereas the loops of plain are always withdrawn in the same direction, from the technical face to the technical back [1].

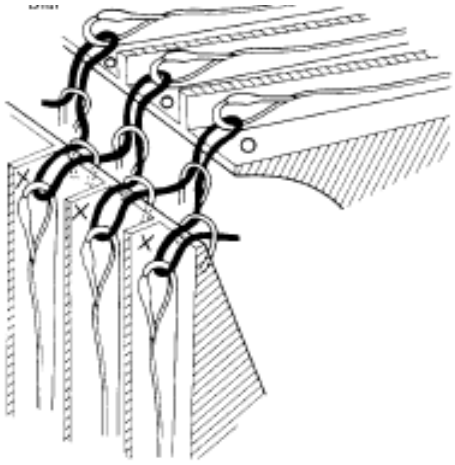

Fig.1. 1x1 rib knitting.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 5, Issue 5 , May 2018

Mock Rib is plain fabric knitted on one set of needles, with an elastic yarn inlaid by tucking and missing so that the fabric concertinas and has the appearance of 1x1 rib. It is knitted at the tops of plain knit socks and gloves. Rib cannot be unroved from the end knitted first because the sinker loops are securely anchored by the cross-meshing between face and reverse loop wales. This characteristic, together with its elasticity, makes rib particularly suitable for the extremities of articles such as tops of socks, cuffs of sleeves, rib borders of garments, and stolling and strapping for cardigans. Rib structures are elastic, form-fitting, and retain warmth better than plain structures.

Cardigan stitches are two-course repeat tuck rib knitwear structures, widely used in the body sections of heavy-weight stitch-shaped sweaters. The tuck stitches cause the rib wales to gape apart so that the body width spreads outwards to a greater extent than the rib border. The tuck loops increase the fabric thickness and make it heavier in weight and bulkier in handle, although the rate of production in rows of loops will be less than for normal 1x1 or 2x2 rib. The greater the proportion of tuck to cleared loops, the heavier and wider the finished relaxed structure.

In the production of a knitted stitch, the leading raising and cardigan cams for that bed and direction of traverse must be in action, whilst for a tuck stitch, the raising cams remain in action but the cardigan cam is taken out of action. It is important to arrange the camming for the needle beds so that, at the start of the traverse when tucking, the first needle is tucking and the last needle in action is in the opposite bed and is thus knitting. If the last needle is tucking, the selvedge tuck loop will withdraw from the needle hook as the reverse traverse commences.

Half-cardigan or *royal rib* (fig.2) is produced on a 1x1 rib base, having tuck loops on one bed only at alternate courses. It is therefore an unbalanced structure with a different appearance on each side and with twice as many cleared loop courses per unit length on the all-knit side as on the tuck loop side. On the all-knit side, one course of loops has very large and rounded loops.

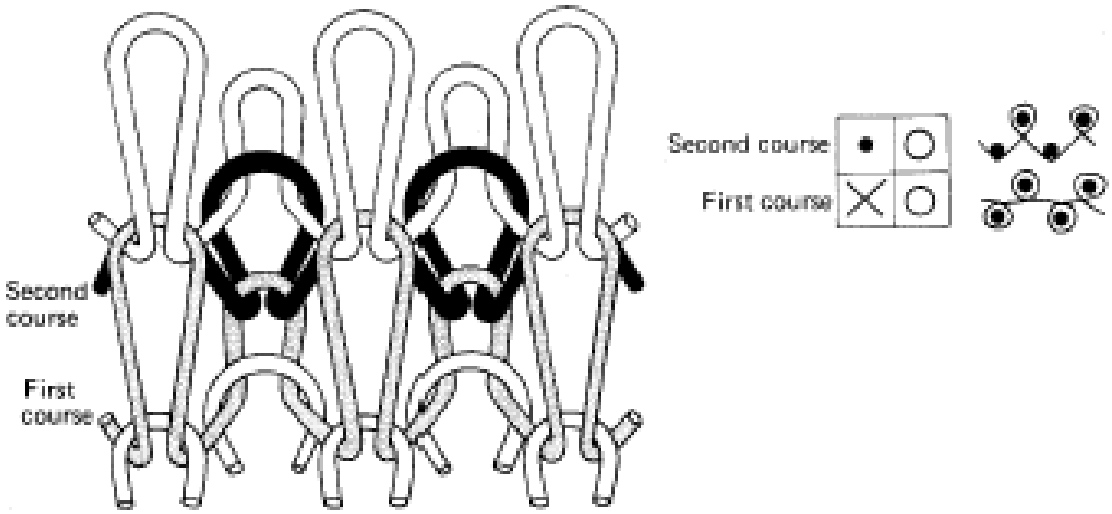

Fig. 2. Half-cardigan loop structure.

This is because they receive yarn from the tuck loops on the other side. The other course of loops on this side has, in contrast, extremely small and insignificant loops because they are robbed of yarn by the elongated held loops on the other side, which consists only of held loops as the tuck loops lie behind them [2].

A two-tuck variation of half-cardigan, based on a four course repeat with each repeat sequence repeated at two consecutive courses, is useful as it produces rounded loops on the knit side as a result of yarn passing into it from the second tuck course.

Full-cardigan or *polka rib* (Fig. 3) consists of one course of loops knitted on the front bed and tucks on the back, and the second course with the sequence reversed, thus producing a balanced 1x1 tuck rib structure with the same appearance on both sides. If different coloured yarns are knitted at alternate courses, a '*shot rib*' will be produced which in the relaxed state will show one colour on one side and the second colour on the opposite side.

In open width, a 1x1 rib fabric will relax by about 30 per cent, half-cardigan by only 5 per cent, and full-cardigan will show no width shrinkage compared with its original knitting width.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 5, Issue 5 , May 2018

To knit half-cardigan on a single-system hand-flat, one of the four cardigan cams is taken out of action so that in one direction of traverse a tuck stitch will be knitted on one needle bed only.

To knit full-cardigan, diagonally opposite pairs of cardigan cams are taken out of action so that in one direction of traverse the front needle bed will tuck and in the return traverse the back needle bed will tuck.

The 2x2 rib version of half-cardigan is termed *fisherman's rib* and the full cardigan version is termed the *sweater stitch*.

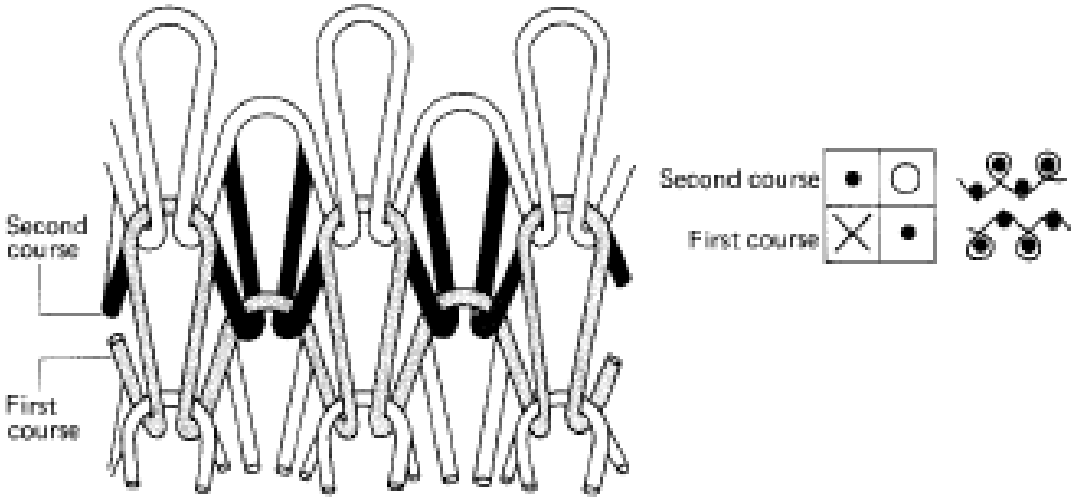

Fig. 3. Full cardigan loop structure.

II. EXPERIMENTAL WORK

For the purpose of definition of technological parameters and physic-mechanical properties in cardigan structure four samples have been developed. Technological parameters cardigan structures are defined, the received results are resulted in table 1.

The analysis of results of the researches spent by many science officers have shown, that decrease in surface density of knitting in certain limits leads to reduction of the expense of raw materials and are not less dangerous to it strength properties as the absolute size of durability of knitted fabrics is high, and while in service products are exposed to the loadings which are not exceeding 10 % from the explosive.

As the knitting is three-dimensional structure in the characterized length, width and thickness and lightness of this structure is necessary to define not two-dimensional criterion (surface density), and three-dimensional (volume density). The volume density of knitting shows the maintenance of textile threads in volume unit.

At use of volume density as criterion of structures lightness the concept "lightness" extends. Thus the category of fabrics with lowered raw material expenditure joins fabrics with the friable structure, having a considerable thickness in comparison with the base. As fabrics lowered raw material expenditure is called the fabrics, which volume density more low, than at base, developed with the optimum module of a loop from an identical yarn.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 5, Issue 5 , May 2018

Table 1
Technological parameters of knitting

	Linear density of yarn, tex	Width of loop A, (мм)	Height of loop B, (мм)	Density of loops on horizontal, Pg	Density of loops on vertical Pv	Length of loop, l (mm)	Surface density, g/m^2	Thickness, mm	Volume density, mg/sm^3
0	PA 32/2	1	0,8	50	40	5	360,6	1,35	267
1		0,9/1	0,8	54/52	45	5,2/5	351,5	1,4	251
2		0,9/1	0,8	54/52	45	5,2/5	357,2	1,4	255
3		1/1	0,9	52/52	40	5,3/5	364,3	1,42	256,5
4		1/1	0,9	52/52	40	5,3/5	371	1,44	257

As criterion of raw material expenditure traditionally consider surface density of a fabric. As is known, decrease in surface density of knitting involves change of operational and hygienic characteristics. Therefore the indicator which simultaneously characterizes and raw material expenditure of fabrics, and a quality indicator is entered. Such indicator is the indicator of lightness knitting structures in which along with surface density its thickness is considered also.

Indicator of lightness knitting structures it is possible to use volume density:

$$\delta = m_{тр} / M,$$

where δ - volume density of knitting, mg/sm^3

$m_{тр}$ - surface density of knitting, g/m^2

M - thickness of knitting, mm.

The surface density developed base cardigan makes interlacings 360,6 g/m^2, the first variant makes - 351,5 g/m^2, the second variant makes - 357,2 g/m^2, the third variant - 364,3 g/m^2, the fourth variant - 371 g/m^2 (fig. 3.1.). If not to consider a base variant, among the developed new variants the highest indicator of surface density has the fourth variant - 371 g/m^2, the least indicator of surface density has the first variant - 351,5/m^2 surface density by variants vary on certain law, i.e. on increase within 5,3 %. The histogram of change of surface density is presented on fig. 4.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 5, Issue 5 , May 2018

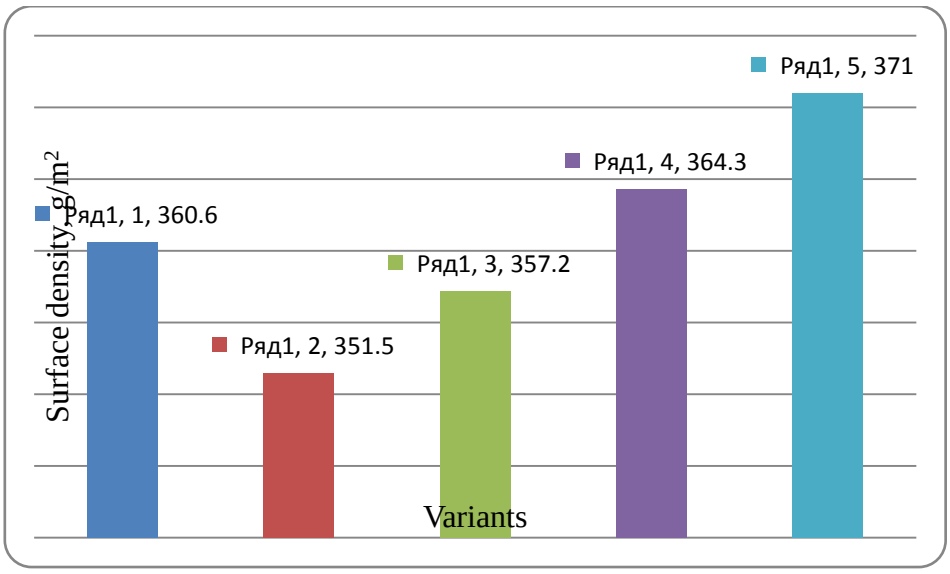

Fig.4. Histogram of surface density changing

If to compare in a percentage parity the surface density of the fourth variant in comparison with the first increases by 5,3 %, on comparison with the second increases by 3,8 %, in comparison with the first increases by 1,9 %.

Proceeding from it is necessary to draw a conclusion, that all above-stated changes are influenced by knitting structure. As rib structures are entered into structure elements of pattern knitting, in this case cardigan sketches which quantity varies in variants, in the developed samples change of surface density is observed.

At definition of a thickness it has been defined a base variant - 1,35, the first variant - 1,4, the second variant - 1,4, the third variant - 1,42, the fourth variant - 1,44, that is from this it is visible that, the thickness of knitting by variants also varies on law of increase (fig.5). Quantity change cardigan sketches leads to change of a thickness of knitting. The histogram of change of a thickness of knitting is presented on fig.5.

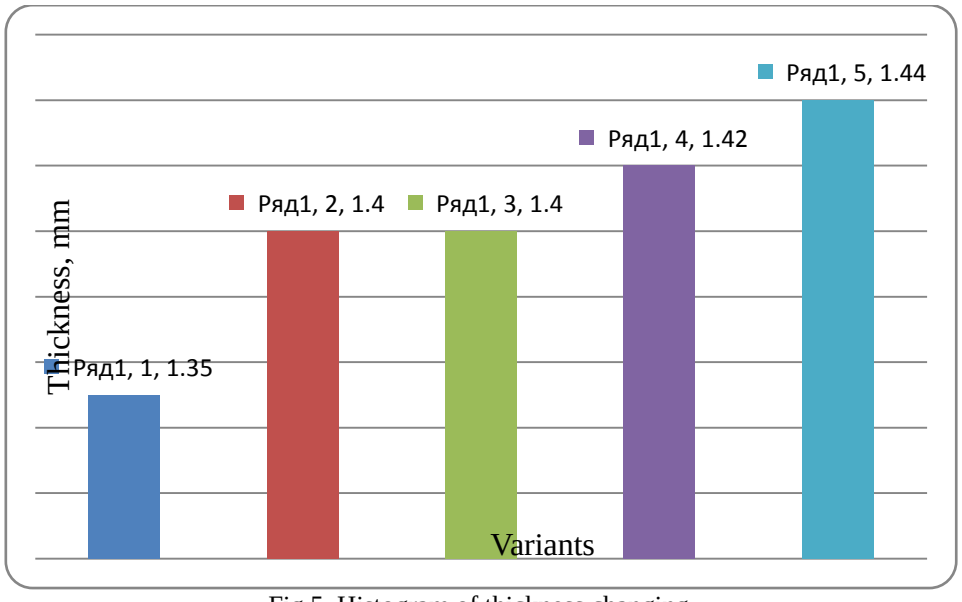

Fig.5. Histogram of thickness changing.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 5, Issue 5 , May 2018

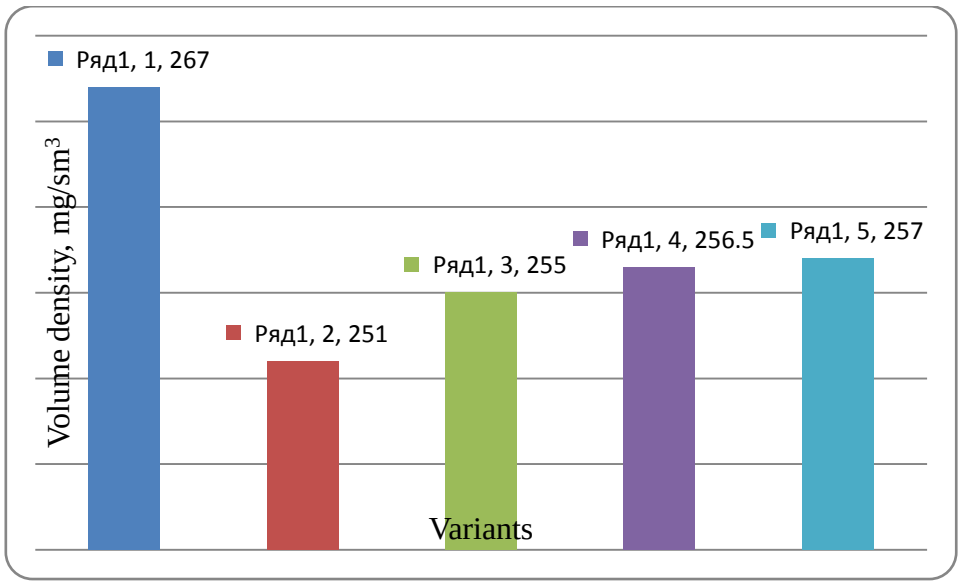

Fig.6. Histogram of volume density changing.

The volume density developed cardigan makes interlacings of a base variant - 267 mg/sm^3, the first variant makes - 251 mg/sm^3, the second variant - 255 mg/sm^3, the third variant - 256,5 mg/sm^3, the fourth variant - 257 mg/sm^3 (fig.6). The histogram of change of volume density of knitting is presented on fig.6.

The volume density by variants varies on certain law, i.e. on increase within 2,4 %. If to compare in a percentage parity the volume density of the fourth variant in comparison with the first increases by 2,4 %, on comparison with the second increases by 0,8 %, in comparison with the third increases by 0,2 %.

From this it is visible, that the volume density of the developed samples also varies on law of increase, but in all new variants the volume density is less, than at a base structure. It means that the less volume density, the raw materials expense is less. Introduction in pattern knitting structure an element means - cardigan sketch reduces the raw materials expense, at the same time improves appearance of knitting.

III. CONCLUSION

Results of analyses show that offered structures have some advantages to compare to basic structure. On the aim of resource economy technology they give a possibility of raw material expenditure decreasing 2,4%. There is not lost strength parameters. Stabilization of elongation on length and width is possible due to structure and knitwear has more form stability. Structures consist of normal rib loops, plain structure loops, cardigan stitches and elongated loops. Meanwhile they are offered to produce both at simple and modern computerized flat knitting machines like SHIMA-SEIKI, PROTTI, STOLL, UNIVERSAL that have necessary technological possibilities.

REFERENCES

1. Spencer D.J. Knitting technology. Woodhead publishing ltd. Third Edition. 2001.
2. Kudryavin L. I., Shalov I. I. Fundamentals of knitting technology Moscow, Light Industry, 1991 y.