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Investigation of the Process of Formation of Special Purpose Tape and Calculation of its Parameters

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ABSTRACT: The article presents numerical characteristics of yarn processing in the tape, equations are calculated that take into account the development of the relief weft for one thread in the rapport of the weave. It is established that in order to determine the development in the rapport of the pattern, it is necessary to take into account the number of repetitions of rapports on the basis and along the weft in the repeat of the pattern along the width and length of the tape.

KEYWORDS: special purpose tape, yarn processing, relief weft, rapports, pattern.

I. INTRODUCTION

The formation of a tape is a process of interlacing two systems of threads under the joint action of weaving loom mechanisms that perform technological operations: the tension and opacity of the base, the formation of shedding, the surfacing of the weft thread to the edge and the winding of the fabric. Thus, the process of tissue formation occurs all over the length from the wax to the stock roll with the obligatory participation of all the mechanisms of the loom.

When the weaving machines are equipped with the main brakes, the rotation of the bead and, consequently, the release of the base are made through an elastic filling system - the tension of the fabric and the base. As the fabric grows, the tension of the fabric and the base increases as soon as the moment of inequality between the value of the tension of the base and the braking force of the wax comes in, the latter begins to rotate and the base leaves into the working zone of the machine. On the tape-making machine of Swiss manufacture "Jakob Muller" with a jacquard head the basic brakes of a friction are established.

II. REVIEW OF THE KNOWN WORKS

Until now, there are ways to determine the work-out for single-layer fabrics [1-7]. This approach gives a large error in the calculation of fabric parameters, which negatively affects the production planning process and economic indicators. With the help of formulas it is not possible to determine the work-out for multilayer and jacquard fabrics.

III. INVESTIGATION OF SPECIAL PURPOSE TAPE PARAMETERS

Since the processing of the background and edge threads is different, the basic brakes are also different. On the background main brake, warp yarns having a tension F curve around the movable shaft, the pre-tension of the brake band, enveloping the pulley of the bead, is equal to T. The desired tension of the base is created by loading or unloading the spring. The spring acts on the movable arm on which the guide shaft is integrated. On the movable arm, one end of the brake band is fixed and the other end of the tape is fixed to the stationary lever.

As soon as the base suture system is triggered, the guide shaft 4 is raised by the tension of the warp yarn 1, as a result of which the braid band is freed from the action of the brake band, the base is knitted.

As soon as the base swaging system stops, the thread guide is released downward under the tension of the spring 2. The brake tape is in contact with the surface of the bead, therefore, the warping of the base stops.

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When the tension of the spring changes, the brake bands press more or less force against the pulley of the bead. between the belt and the nave the necessary resistance of the substrate release is created, and consequently the required filling tension of the substrate.

Maximum braking torque

$$M_{max} = TR_t (1- e^{-f \alpha}),$$

where α is the angle of the brake band of the brake pulley of the bead;
Rt is the radius of the brake flange of the bead;
f is the coefficient of friction;
e is the base of the natural logarithm.

Equilibrium of the lever 6 in the continuous mode

$$Fa_1 \sin \beta + Ta_1 \sin \beta_1 - Pfa_2$$

where a1 and a2 are the brake design parameters;
β and β1 are the slope angles of the warp yarn coming off the warp;
P - force of action of a spring 2

The value of $T<0$ indicates a violation of the continuous brake operation.

On the main brake, the tension of the thread is established by twisting or releasing the bolt. When the thread swing mechanism is triggered, the edge threads 1 circle the shaft 4 downward. As a result, the small flanges of the weaving 6 are released from the frictional force of the support 5, the thread of the yarn occurs. As soon as the thread hooking mechanism stops, the tension of the thread 1 on the shaft 4 stops, it returns to its original position.

Consequently, the metal plate 3 rises upward, between the support 5 and the bead flange, the necessary resistance to the release of the bead is created, hence, the threading of the yarn stops.

Obligatory condition of the brake of the edge threads is the contract between the support 5 and the brake surface of the bead flange.

Maximum braking torque

$$M_{max} = fNR_t,$$

where f is the coefficient of friction;
N-pressure of the lever on the new;
Rt is the radius of the brake flange of the bead.

Equilibrium of the brake lever 3 in the non-stop mode
$Na_1 - Fa_2 \sin\beta - Pa_2$

where a1, a2 - the design parameters of the brakes
β - the angle of inclination of the warp thread coming down from the warp;
P - bolt displacement;
The non-continuous regime is violated if N 0

In the mechanism of laying the weft and the formation of the edge (Fig.1), the ducks in the shed are laid with the help of needle 1, which performs the forward-return motion. In the zone of the hook 2 of the needle 1, a thread 4 is taken up by the galleys 7 of the jacquard machine and is laid in the shed, and the thread 3 is not fed into the hook zone 2 and therefore does not participate in the formation of the weave pattern.

On the side opposite to the movement of the needle, the ear edge is obtained by means of a reed needle 5, where the loop is knitted from an additional (edge) thread 6 wound on a special reel.

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Lentotkatsky lathe Swiss made «Jakob Muller» with a jacquard head, which is one of the advanced technologies of the world textile engineering, has a computer «Mucomp 3 Junior», equipped with an optical and electronic scanning device. This frees the artist-dessinator from the need to manufacture cartridges and speeds up the process of drawing.

Using a computer allows you to do without developing samples, because on the monitor we can view the drawing in a weave with the specified color hues.
In Fig. 1 shows the technological chain of designing jacquard ribbons for special purposes. The design phase from drawing the drawing to the transfer of the program of the weave pattern was us considered in the previous chapter.

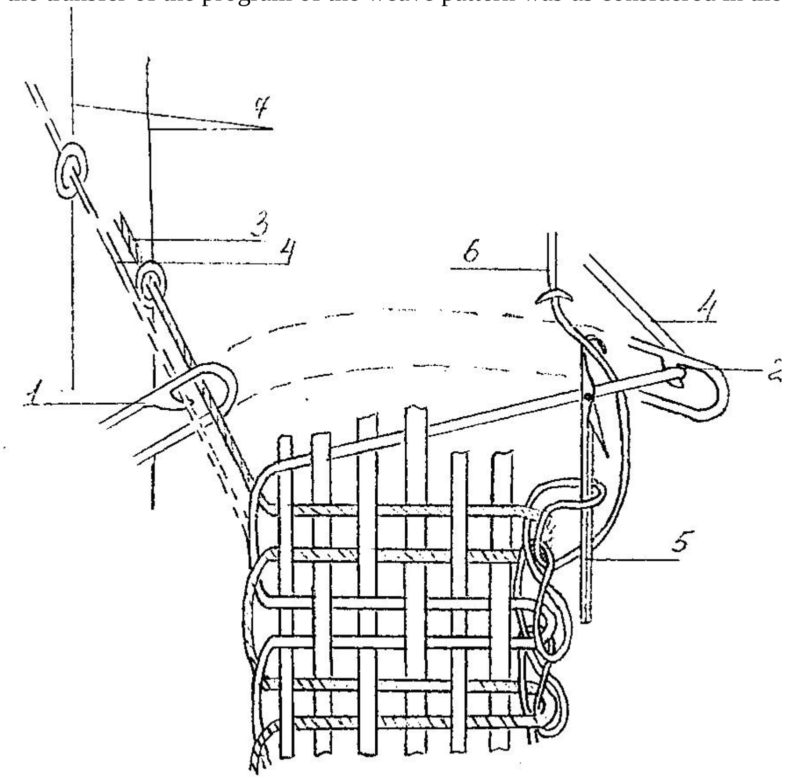

Fig. 1. Ducking and Edging

In the stage of technology we prepare the basis and weft for weaving, the production of jacquard tape on a loom, the development and delivery of semi-finished products to finished products (epaulet). Table 3.1 and 3.2 show the characteristics and parameters for the equipment for walking and weaving. And in Table 3.3, the jacquard tape refill card for the base and weft.

Let's give a technical calculation of the Jacquard tape.

1. The basis. 1 background - polyester yarn 12,6 tex
600кр./м the account of 176 threads
2 background - polyester yarn 12,6 tex
600кр./м the account of 176 threads
3 edges - polyester yarn 12,6 tex
600кр./м the account of 48 threads
Total 400 threads

2. Duck 1 background - polyester thread 8.7 tex, 120cr / m
2 pattern - viscose 16.6 tex, 120cr / m
3 edge - polyester thread 5.7 tex

3. The width of the tape VL = 69 mm

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4. Density of filaments based on Po = 60 n / cm
5. Duck density is Pu = 50 N / cm

Modern jacquard weaving machines are unified, ie, having several filling densities, it is possible to diversify the assortment of jacquard fabrics. A slight difference in the filling density on the basis is compensated by the density of the duck. On the same type of machines with the same jacquard machines, the same number of working hooks is selected and they take the same filling width, regardless of the filling density. The standard filling and density on the basis of 60 threads per 1 cm are installed on the tape-weaving machines "Jakob Muller". Consequently, the standard refueling should take into account the following nuances.

The choice of the filling width of the fabric depends on the filling width of the machine.

The number of working hooks affects the size of the part, the size of the pattern on the base and the choice of the weave for the background.

The number of working hooks divided by the width of the filling should be an integer, and this whole number determines the number of rapports or parts in the dressing and the shift of the filling density of the fabric over the base. In the case of obtaining an odd number, change the number of working hooks or the width of the filling.

All calculations take into account the number of hooks and the width of the refilling of the background without taking into account the edges.

By the nature of the structure, jacquard fabrics can be simple (single-layered), where no more than two thread systems are used and complex (multilayered), where at least three yarn systems and more are used. For the shoulder straps, we use two and three weft jacquard fabrics in which one warp yarn system and two or three weft yarn systems are involved in forming the ribbon, with the weft yarns arranged in the belt two or three layers. These fabrics are characterized by the fact that the weft yarns needed for the drawing are allocated on the front side of the tape, and in threads where they do not have to stand out, these threads are removed to the underside of the fabric. The peculiarity of the production of these tapes is that the commodity regulator withdraws the fabric when laying the background (ground) duck and does not divert the fabric from the forming zone when laying relief (patterned) Utechin. This causes the packing of the relief Utopians on top of the background Utonchin layers, rather than side by side.

Therefore, when determining the density of the tissue (tape), it is necessary to have:
- The number of basic and weft yarn systems;
- Density of threads in each system;
- Alternating threads of each system, forming one ground.

Table 3.4 shows the calculation results for the density of the base (Po), the width of one part of the filling (H), and the number of filling parts (N) for the filling density (standard), based on 60 threads / cm, the number of hooks 352 and the total width of the fillings tape W = 25.2 cm.

The determination of the data and calculations was carried out according to the formulas.

The number of parts in the refueling (N) and the shift (C) of the density on the basis.

$$N = C = K / W = 352 / 25.2 = 14$$

hence the number of parts N = 14 pieces and the density shift on the basis of C = 14 filaments.

Width of one part in the filling (H)

$$R = K / P = 352/196 = 1.8 \text{ cm}$$

Maximum fill density of warp threads (P).

$$Po = K / 4 = 352 / 1.8 = 196 \text{ filament / cm.}$$

To determine the subsequent filling densities, it is necessary to subtract the density shift (C) from the previous density,

$$P02 = P01-C;\ P03 = P02-C;\ P04 = P03-C;\ \text{etc.}$$

The determination of each variant of the width of one part of the filling in the variants requires the number of working hooks (K) to be divided by the density of the options, i.e.,

$$P1 = K / P01;\ 22 = K / Po2;\ R\ 3 = K / P\ o\ 3;\ \text{etc.}$$

To determine the number of fueling parts (N) in the variants, the total width of the filling (W) needs to be divided into variations of the width of one part of the filling (H), ie

$$N = W / W1;\ N = W / W2;\ N = W / W3;\ \text{etc.}$$

For the machine "Jakob Muller" from all options, the most convenient is the filling and working out of the 11th variant tape, since the machine is set up to produce four ends of jacquard tapes. The 11th variant: P0 = 56 threads / cm; K = 352 hooks; the width of one part of the filling is R = 6.3 cm; number of parts in the filling N = 4, total width of the filling (without edges) W = 25.2 cm.

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The total number of hooks of the background and the edge is 400 hooks plus hooks to change the color of the weft and cut off the commodity regulator when laying a patterned duck, the number of hooks will total about 416 hooks. Therefore, if the jacquard machine has 640 hooks, then the working hooks will be only 416 pieces (Figure 2).

According to the composition patterns for the drawings of jacquard ribbons can be different - geometric, symmetrical, in stripes, in a cage, with a border repeating over a certain rhythm of the detail, or arbitrary arrangement, free composition.

The working of the warp and weft is one of the main factors on which the structure and properties of the jacquard ribbons depend, as well as the consumption of raw materials. The working is determined by dissolving a standard (accepted) sample of the jacquard tape.

In Table 1 and 2, the experimental values of the run-off for the basis and weft for the fragment of the jacquard weave pattern are shown (Figure 2).

Table 1.
Numerical characteristics of threading in the belt

No.	The name of the item is	Indicators					
		Repetitions, m					Average value of Y
		y_1	y_2	y_3	y_4	y_5	
1	1 background of basics	1,05	1,06	1,04	1,07	1,03	1,05
2	2 background	1,05	1,05	1,07	1,03	1,05	1,05
3	Edge of the base	1,03	1,05	1,02	1,04	1,06	1,04
4	Background duck	1,08	1,10	1,06	1,06	1,10	1,08
5	Pattern duck	307	319	341	328	320	323
6	Edging of the weft	12,5	13,0	12,8	13,2	12,5	12,8

Table 2.
Numerical characteristics of yarn processing in a tape

No.	The name of the item is	Indicators				
		Dispersion S^2	Avg. sq. m. deviation S	Ratiob variations C	Absolute error ε	Relative error δ
1	1 background of the base	0,00025	0,016	1,52	0,02	1,09
2	2 2 background	0,00020	0,014	0,33	0,02	1,60
3	Edge of the base	0,00025	0,016	1,54	0,02	1,90
4	Background duck	0,00040	0,020	1,85	0,03	2,30
5	Pattern of the weft	157,50	12,55	3,90	16,0	4,80
6	Edging of the weft	0,0950	0,310	2,42	0,40	3,00

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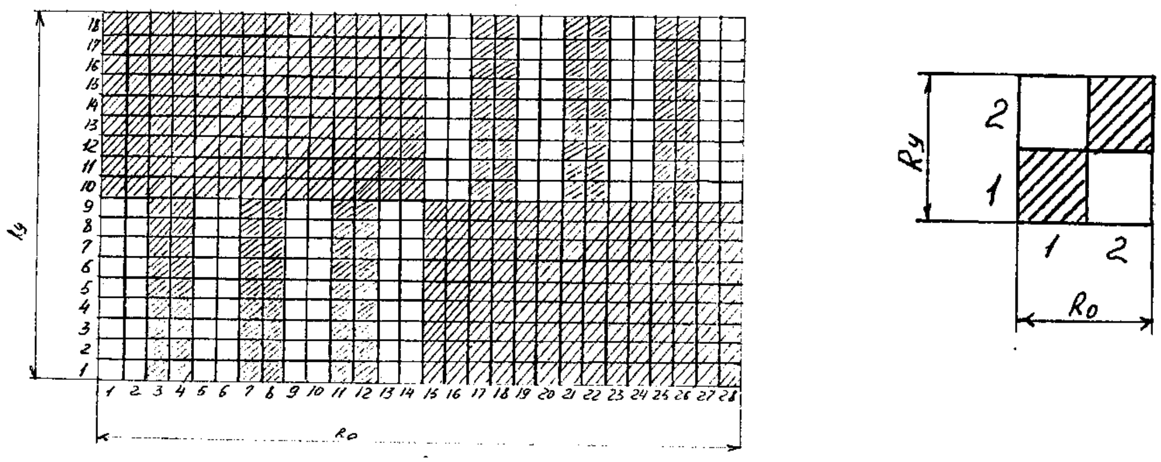
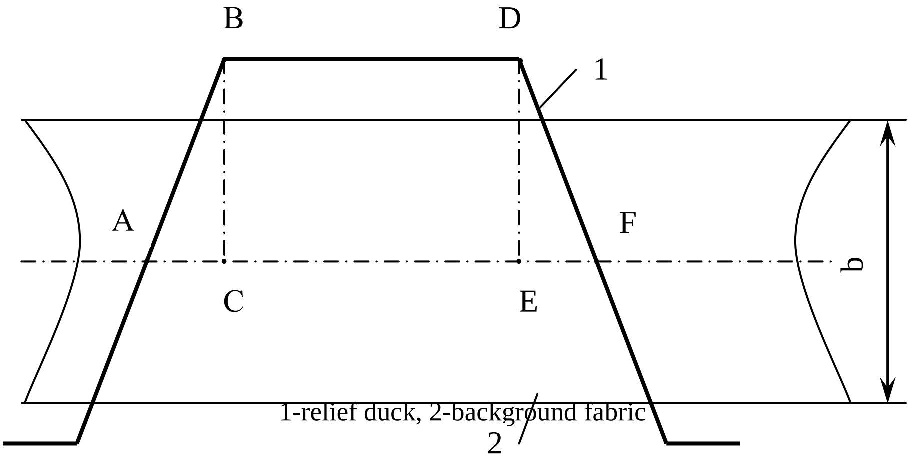


Fig. 2. Fragment of the weave pattern on the jacquard ribbon



1-relief duck, 2-background fabric

Fig. 3. To the calculation of the working of the relief weft

Work of the relief weft (according to figure 3) of one interlacing rapport

$$A_y = \frac{AB + BD + DF - AC - CE - EF}{AB + BD + DF} = \frac{2(AB - AC)}{2AB - BD} \qquad (1)$$

Also from Fig. 3 follows.

AC = EF = b / K Ho

BC = DE = b

$$AB = \sqrt{BC^2 + AC^2} = \sqrt{b^2 + (b / K_{Ho})^2}$$

BD = (RO + tU) b / KHo

In equation (1), the number two means the number of duck transitions from the underside to the front side of the fabric, so we can denote it by t, and the formula will take the form after the statement;

$$a_y = \frac{t_y\left(\sqrt{b^2 + (b/K_{Ho})^2} - b/K_{Ho}\right)}{t_y\sqrt{b^2 + (b/K_{Ho})^2} + (R_o - t_y)\frac{b}{K_{Ho}}} * 100 \qquad (2)$$

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Equation 2 takes into account the development of the relief weft for one thread in the interlacing rapport. To determine the working time in the rapport of the pattern, it is necessary to take into account the number of repetitions of rapports on the basis and along the weft in the repeat of the pattern along the width and length of the tape, i.e.

$$n_o/R_o + (n_y/R_y) * C_1 \quad (3)$$

where: no - the number of warp threads in the repeat of the pattern along the width of the tape.

ny- number of threads of the duck in rapport pattern a along the length of the tape.

Ro, Ry-rapport of the base weave of the patterned duck respectively on the basis and on the weft.

C1- number of relief ducks laid in one hollow.

Substituting (3) in (2) and we have the work of the relief weft in the jacquard tape, taking into account the report of the tissue pattern.

$$a_y = \frac{t_y(\sqrt{b^2 + (b/K_{Ho})^2} - b/K_{Ho}) * (\frac{n_o}{R_o} + C_1 \frac{n_y}{R_y}) * 100}{t_y \sqrt{b^2 + (b/K_{Ho})^2} + (R_0 - t_y) * b/K_{Ho}} \quad (4)$$

Let's give an example of calculating the work of a patterned duck;

b = 0.41 mm; d0 = 0.144 mm; dy = 0.12 mm;

C1 = 2 - for the rapier machine.

KHo = 0.5; no = 352 threads; ny = 730 Ro = 28; Ru = 14; tu = 8 (see Figure 2) for one fragment of the rapport rapport.

V. CONCLUSION

Comparison of the calculated value with the experimental values (Table 2) shows that the deviation is about 5%, which is acceptable in the textile industry. Also new method has so benefits, as:

1. A method for securing the sagging patterned weft threads on the wrong side and enhancing the relief effect on the face of the jacquard tape is proposed.

2. The technological sequence of designing, preparation of development of jacquard ribbons of special purpose is developed.

3. It is expedient to produce special jacquard ribbons on the basis of local raw materials (natural silk), since this type of raw materials is most available in the Republic of Uzbekistan in the required quantity and in price terms and possesses good ergonomic properties.

4. A formula is obtained for working the relief weft for two-jacquard jacquard fabrics with a large repeat of the pattern.

5. Justified basis density, width and number of ends in the dressing when producing jacquard ribbons.

6. The technological process of producing jacquard tape on a loom was studied using the mathematical method of rototable planning of a second-order experiment. The geometrical interpretation of the mathematical model has been studied using slices.

7. Optimal technological parameters of jacquard tape production are determined. The level of breakage of the warp threads is 0.05 breaks per 1 m of fabric at the filling tension of the base-20 cN, the value of the spacing is -15 mm. and the position of the rock above the breast by 25 mm.

REFERENCES

1. Alimbaev E.Sh. Tўқima Tuzilishi Nazariyasi. -T .: Alokachi, 2005. - 231 b.
2. Alimbaev E.Sh. Tўқow ўrilshlarni tasniflash. -T .: TTECИ, 1996. - 18 б.
3. Daminov A.D. Basics of forecasting the structure and design of textile fabrics. Author's abstract. dis. ... Doct. tech. sciences. -T .: TITLP, 2006. - 42 pp.
4. Surnina N.F. Automation of designing fabrics. Textile industry. 1989.-No. 9. -FROM. 60.
5. Lomov SV, Gusakov A.V. Coding of interlacing of laminated frame woven structures. Proceedings of Higher Educational Institutions. Technology of the textile industry, 1993. -№3. - from. 43-50.
6. Damyanov G.B. and others. The structure of the fabric and modern methods of its design. -M .: Light and food industry, 1984. - 237 p.
7. O. Kutepov. Structure and design of fabrics. -M .: Legprompromizdat, 1988. - 220 with.

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