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Weft Take-up Distribution Over the Width of Woven Fabrics Manufactured with the Use of Jet Looms

Abstract

An investigation of weft take-up uniformity over the width of decorative woven fabrics for drapery manufactured with the use of a NISSAN LW 551 hydraulic loom and a PICANOL OMNI pneumatic loom is presented. The influence of the loom picking mechanism settings on the value and the distribution of weft take-up in woven fabrics has been estimated. The authors state that to achieve as good a weft take-up distribution as possible and thereby a uniform woven fabric structure, with the use of a pneumatic loom, the best solution is to use high air pressure in the crimp removal jet or low air pressure in the subnozzles; with the use of a hydraulic loom the most advantageous solution is to set a great water portion volume.

Key words: *weft take-up, woven fabrics, jet looms, pneumatic looms, hydraulic looms, picking mechanism.*

Introduction

The aesthetic and usage qualities of a woven fabric are qualified by the uniformity of its structure. Every distortion of the structure uniformity causes essential difficulties in realising most finishing processes; such a distortion is quite frequently the reason why fabrics of unsatisfactory quality are obtained. One sources of non-uniform woven fabric structure may be the picking system. However, the authors have found no publication in the available world literature concerning the influence of the picking system on the formation of weft take-up distribution over the woven fabric width.

In jet picking systems, the weft is 'pushed' during insertion into the shed, in opposition to the remaining picking systems, (the inertia and guiding systems) where the weft is pulled in the shed. The consequence of this is weft control limitation over the period of introduction. One of the weft ends remains free; what is worse, this is the beginning of the introduced segment, which increases the difficulty of crimp removal and tensioning in the shed. The mass inertia of the accelerated thread causes the crimp removal force (the stretching force) to decrease with an increase in the distance from the tensioner (yarn trapper or jet) after the end of picking. From the situation described above, it can be anticipated that conditions will occur on the side opposite to weft insertion, which would be conductive to weft segment slackening; this in turn can cause the weft take-up to be non-uniform over weaving. In the hydraulic picking system where the bonds between thread and transmitting medium (water) are stronger than in a pneumatic loom, this phenomenon can be less dangerous in its effects. It is assumed that the subnozzle system should also limit the take-up variability over the width of the loom in comparison to the single-jet system.

In picking systems in which the weft is pulled (classical shuttle, projectile, rapier) a possibility exists to control thread tension over the whole shedding inserting cycle. In these cases the non-uniform weft take-up will be derivative to weft variability of tensioning or warp thread tension variability.

The Aim of Investigation

The aim of this work's investigation was to analyse the process of creating a non-uniform distribution of weft take-up over the width of woven fabrics manufactured with the use of jet looms and a comparison of picking conditions in single-jet hydraulic and multi-subnozzle pneumatic systems.

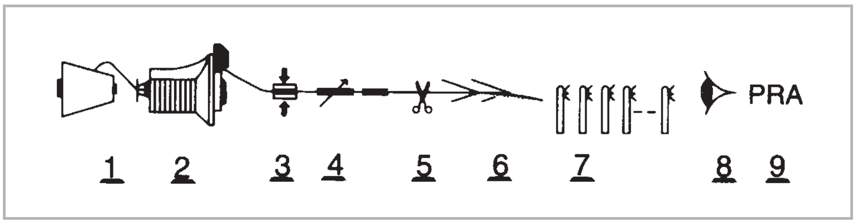

Figure 1. Picking schema of the PICANOL OMNI pneumatic loom; 1 – weft bobbin, 2 – VSG dosing – feeding assembly, 3 – PFT programmable weft brake, 4 - main jets, 5 – weft cutters, 6 – weft inserting synchroniser , 7 – subnozzles, 8 – sensor which controls the completeness of weft flight with the crimp removal jet, 9 – mechanism for automatic removal of the broken weft.

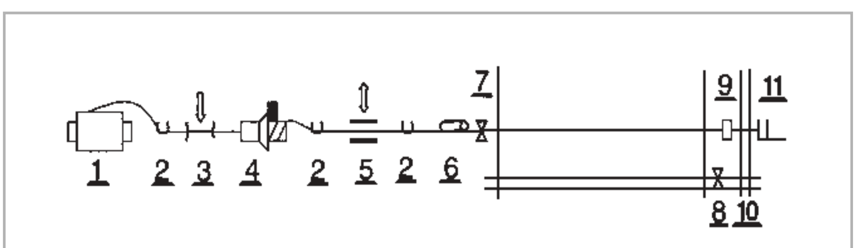

Figure 2. Picking schema of the NISSAN hydraulic loom; 1 – weft bobbin, 2 – guides, 3 – cymbal tensioner, 4 – dosing – feeding assembly, 5 – controlled clamp, 6 – jet, 7, 8 – weft cutters, 9 - sensor which controls the completeness of weft flight, 10 – catch selvedge, 11 – monitor.

*Table 1. Experiment conditions (settings) for the PICANOL OMNI pneumatic loom; designations: P - air pressure, t - exhaust time (indexes related to: G - the main jet, S - the subnozzles, P - the crimp removal jet), PFT - programmable weft brake (braking force), *loom set by the master.*

No	Parameter	Unit	Experiment number								
			1*	2	3	4	5	6	7	8	9
1	P_G	bar	4.5	7.5	2.5	4.5	4.5	4.5	4.5	4.5	4.5
2	t_G	ms	3-33	3-33	3-33	3-33	3-33	3-33	3-33	3-33	3-33
3	P_S	bar	5	5	5	7	2	5	5	5	5
4	t_{S1}	ms	1-27.5	1-27.5	1-27.5	1-27.5	1-27.5	1-39	1-16	1-27.5	1-27.5
	t_{S2}	ms	5.5-32	5.5-32	5.5-32	5.5-32	5.5-32	5.5-43.5	5.5-20.5	5.5-32	5.5-32
	t_{S3}	ms	10-36.5	10-36.5	10-36.5	10-36.5	10-36.5	10-48	10-25	10-36.5	10-36.5
	t_{S4}	ms	14.5-41	14.5-41	14.5-41	14.5-41	14.5-41	14-52.5	14-29.5	14.5-41	14.5-41
	t_{S5}	ms	18.5-45	18.5-45	18.5-45	18.5-45	18.5-45	18-56.5	18-33.5	18.5-45	18.5-45
	t_{S6}	ms	23-49.5	23-49.5	23-49.5	23-49.5	23-49.5	23-57.5	23-38	23-49.5	23-49.5
	t_{S7}	ms	27-54	27-54	27-54	27-54	27-54	27-57.5	27-42.5	27-54	27-54
	t_{S8}	ms	31-58	31-58	31-58	31-58	31-58	32-58	32-51.5	31-58	31-58
	t_{S9}	ms	34-58	34-58	34-58	34-58	34-58	36.5-58	36-51.5	34-58	34-58
5	P_P	bar	3	3	3	3	3	3	3	5	1
6	PFT	-	5	5	5	5	5	5	5	6	1

Table 3. Weft take-up over the width of woven fabric manufactured with the use of the PICANOL OMNI pneumatic loom; designations: w_w - average values of weft take-up in the particular zones, S - standard deviation of take-up, CV - variability factor of take-up, R - dispersion of take-up (difference of maximum and minimum values).

Experiment number	w_w, %					Average w_w, %	S, %	CV, %	R, %	
	zone designation									
	1	2	3	4	5				max.	min.
1	3.52	3.22	3.20	3.14	3.98	3.41	0.313	0.092	3.98	3.14
2	3.80	3.50	3.22	3.74	3.90	3.63	0.244	0.067	3.90	3.22
3	2.98	2.94	3.04	3.38	3.94	3.25	0.376	0.115	3.94	2.94
4	3.26	3.16	3.38	3.24	3.90	3.38	0.266	0.078	3.90	3.16
5	3.72	3.86	3.80	3.92	4.08	3.87	0.122	0.031	4.08	3.72
6	3.74	3.34	3.12	3.16	3.82	3.44	0.292	0.085	3.82	3.12
7	3.58	3.50	3.14	3.68	4.14	3.61	0.322	0.089	4.14	3.14
8	3.44	3.32	3.12	3.66	3.54	3.42	0.186	0.054	3.66	3.12
9	3.50	3.28	3.18	3.62	4.04	3.54	0.301	0.085	4.04	3.18

The Object of Investigation

The tests were carried out with the use of a PICANOL OMNI-4-F190 pneumatic loom and a NISSAN LW 551-2M hydraulic loom. The picking system of the PICANOL pneumatic loom is presented in Figure 1, whereas that of the NISSAN hydraulic loom is shown in Figure 2. All the tests were carried out in the ZPJ Wistil S.A. company. The fancy polyester woven fabric of sateen weave of 4/1(3) type has been manufactured with the use of the looms mentioned above. The following were used as raw materials: for warp: PET yarn, textured SPN of linear density 84 dtex f 48; for weft: PET yarn, textured SPN of linear density 84 dtex f 48x2. Number of warp thread: 9620, width in the reed: 185 cm, warp take-up: 7.2%; density of weft loomstate: 322/dm, width of raw woven fabric: 180 cm; fabric aerial density: 104.9 g.

*Table 2. Experiment conditions (settings) for the NISSAN hydraulic loom; designations: k - water stream pressure set by the change of distance 'k' of the spring casing in relation to pump housing, t_e - moment of opening and closing of the electromagnet pin of the dosing - feeding assembly, t_z - moment of opening and closing the clamp, V_w - water portion volume set by distance 'l' of the screw blocking the piston move, *loom set by the master.*

No	Parameter	Unit	Experiment number				
			10*	11	12	13	14
1	k	mm	50	42 (max.)	53 (min.)	50	50
2	t_e	°	95-235	90-215	90-235	95-235	95-235
3	t_z	°	90-300	90-310	10-320	90-300	90-300
4	V_w	mm	16	16	16	14 (max.)	23 (min.)

Tests and Test Results

Nine tests were carried out with the use of the PICANOL loom. In every test, different setting values of the picking mechanism which introduce

Table 4. Weft take-up over the width of woven fabric manufactured with the use of the NISSAN hydraulic loom; designations as in Table 3.

Experiment number	w_w, %					Average w_w, %	S, %	CV, %	R, %	
	zone designation									
	1	2	3	4	5				max.	min.
10	4.32	4.64	4.66	4.42	4.40	4.49	0.14	0.03	4.66	4.32
11	4.64	4.40	4.62	4.82	4.36	4.57	0.17	0.04	4.82	4.36
12	5.26	4.90	4.70	5.08	5.26	5.04	0.22	0.04	5.26	4.70
13	4.32	4.68	4.60	4.14	4.66	4.48	0.21	0.05	4.68	4.14
14	4.46	4.58	4.56	4.44	5.28	4.66	0.31	0.07	5.28	4.44

the weft into the shed were used. The tests were conducted at maximum and minimum settings of the air pressure in the main and crimp removal jets as well as in the subnozzles. The test conditions also included the longest and shortest air exhaust from the subnozzles and the maximum and minimum braking force of the programmable PFT brake for weft. Moreover an experiment was conducted in which the loom was set by a weaver (a weaving master) according to the conditions he considered optimal.

Fife tests were carried out with the use of the NISSAN loom. The tests were carried out at maximum and minimum pressure of the water stream, at the smallest and greatest water portion volume, at loom setting accepted by the weaving master as optimal. The setting parameter values are presented in Tables 1 and 2 for both loom types.

The woven fabric width was divided into five zones of about 300 mm width. A fabric band lying at the side of the weft insertion was chosen as the first zone. Fabric samples were taken from all individual experiments and the weft take-up was laboratory-assessed.

The weft take-up of the woven fabrics was assessed in a room acclimatised according to standard PN-88/P-04636 'Assessment of warp and weft take-up' (in Polish). The average take-up values in the particular zones for the PICANOL OMNI loom are listed in Table 3, and those for the NISSAN loom in Table 4.

Analysis of Results

The assumption was accepted that the weft take-up over the width of a woven fabric is a random variable on which three factors have influence. These factors are:

1 - setting parameters of the picking mechanism,
2 - level of the parameter set with the use of the picking mechanism, and
3 - zone of fabric width.

The measurement results were elaborated with the use of the STATISTICA computer programme with the 3-way ANOVA procedure. The results of the particular variants are presented in Tables 5-7. The first column in each table contains the notation of factors or of interaction of the factors, the second - the value of the F-Snedocore statistic for the significance test of the effects of the factor under consideration, and the third - the connected significance level.

Estimation of Weft Take-up Distribution for the PICANOL OMNI Pneumatic Loom

According to the three-factoral variance analysis, the factors A, B, and C which influence the weft take-up were designated as follows:

A: r_1 - air pressure of the main jet,
r_2 - air pressure of the subnozzles,
r_3 - time of air exhaust from the subnozzles, and
r_4 - air pressure of the crimp removal jet and braking forces of the weft tensioner PFT;
B: s_1 - maximum parameter value, and
s_2 - minimum parameter value;
C: t_{1-5} - the succeeding zones of fabric width.

Table 5. Results of variance analysis for the PICANOL OMNI pneumatic loom.

Factor or interaction	F-Snedecor statistic	Significance level
setting points (A)	30.2706	0.000000
parameter level (B)	1.0090	0.315825
woven fabric zone (C)	232.0135	0.000000
setting point - parameter level (AB)	157.9238	0.000000
setting points - woven fabric zone (AC)	14.2915	0.000000
parameter level - woven fabric zone (BC)	4.0359	0.003248
setting points - parameter level - woven fabric zone (ABC)	19.2167	0.000000

The analysis of Table 5 allows us to state that an essential influence on the weft take-up exists for all factors analysed, independently, directly or by interaction with other factors. However, the significance level of factor B is higher than the level accepted in textile investigations (0.05), which could be taken as a lack of essential influence of this factor; nevertheless the significance level for interaction of factor B with the remaining factors indicates its significance in interaction. For example, the increase of the setting value of the particular setting points causes a substantial increase as well as decrease in the weft take-up. The influence character of the particular factors is shown in Figures 3-5.

From the analysis, it results that the setting values of the particular control points inf the picking mechanism have an essential influence on the fabric's take-up ($F=103.62>F_{kr}$; $p<0.001$). According to Figure 3, in order to achieve the minimum value of fabric's weft take-up, it is necessary to set maximum air pressure for the subnozzles (r_2), the longest time of air exhaust from the subnozzles (r_3), maximum air pressure in the crimp removal jet and maximum weft braking force (r_4), as well as minimum air pressure in the main jet (r_1).

The weft take-up of the particular fabric zones is presented in Figure 4. Irrespective of the working parameter settings of the picking mechanism, the take-up distribution is similar and achieves its lowest value for the central part of the fabric, this is for the zone 3, whereas the highest value is for zone

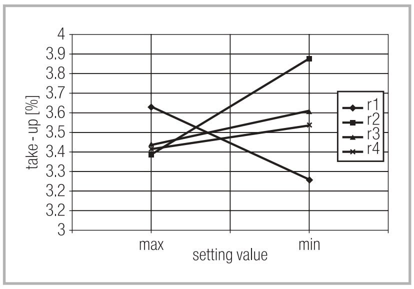

Figure 3. Influence of setting values on the average value of the weft take-up in the fabric.

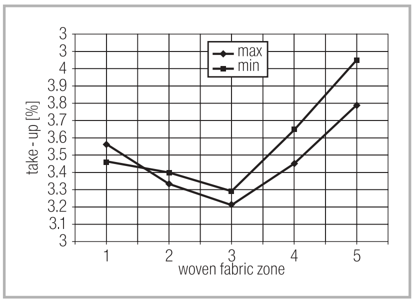

Figure 4. Weft take-up distribution over the woven fabric width as a function of maximum and minimum setting values of the picking mechanism.

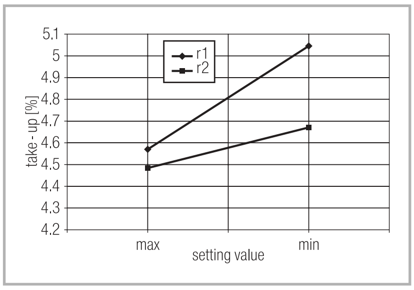

Figure 6. Influence of setting values on the average value of the weft take-up in the fabric.

5. Evidence of this is also the similar dispersion values of the weft take-up (w_{max} - w_{min}) which equal 0.58% for settings relating to the maximum, and 0.76% to the minimum take-up level.

The three-factoral interaction of all analysed factors on the fabric's weft take-up is presented in Figure 5. The loom analysed was equipped with a self-adjusting weft-introducing system of the AIC-Q type. This allows us to maintain an approximately constant moment of the thread arriving at the sensor which controls the completeness of the weft flight. In the case of to high a thread velocity in the air channel of the reed, as a result of maximum air pressure setting in the main jet, the AIC-Q system automatically decreases the amount of streaming air. A consequence of this is a less effective weft crimp removal, which results in a greater take-up of the weft in the fabric (Figure 5a).On the other hand, at minimum pressure setting in the main jet, the AIC-Q system increases the air amount supplied to the main jet; this causes stretching and higher tensioning of the weft in the shed and thereby smaller take-up values.

At maximum air pressure setting in the main jet, a fabric of better uniformity of weft take-up distribution was obtained than at minimum settings (the take-up dispersion was at maximum equal 0.68% whereas at minimum equal 1%). The insignificant difference of take-up values in the 5th zone of fabric width at higher air pressure in the main jet is most likely the result of the weft becoming wavier in this zone. The air pressure is higher but the air volume is smaller (as result of the AIC-Q action) which causes the weft to appear' thrown'. From Figure 5b it results that the weft achieves a smaller take-up value at maximum air pressure setting in the subnozzles. This is most likely caused by a more intensive weft stretching action of the subnozzles. At minimum air pressure setting we achieve greater values of weft take-up. The greatest uniformity of weft take up (dispersion 0.36%) was achieved at minimum air pressure in the subnozzles.

Extending air exhaust time from the subnozzles (Figure 5c) causes more intensive weft stretching in zones 4 and 5, which means a smaller weft take-up. On the other hand, the reduction of the time of air exhaust from the subnozzles, can sometimes causes an excessive inclination for weft waving; as a consequence of this, loops can appear on both sides of the fabric. This phenomenon could also be observed during our experiments.

However, from comparison of the CV values of weft take-up (Table 2), it is evident that the weft take-up uniformity for both setting variants is similar (CV=0.085% for maximum settings and CV=0.089% for minimum settings).

The influence of the braking force and the air pressure in the crimp removal jet on the weft take-up distribution over the fabric width is shown by the dependence in Figure 5d. One can see from this that setting maximum braking force of the programmable PFT weft brake only influenced the weft take-up distribution in the first four zones to an unsignificant degree. We assume that for processing textured polyester multifilaments, a setting of great braking force is unnecessary considering the great friction of the thread in the brake.

On the other hand, the air pressure value in the crimp removal jet is responsible for the weft take-up distribution on the right side of the fabric. Maximum pressure setting causes greater weft tension in the final phase of weft insertion, and makes the weft removal inside the shed impossible. This is illustrated in Figure 5d as a visible decrease of weft take-up in the fifth zone.

Estimation of Weft Take-up Distribution for the NISSAN Hydraulic Loom

According to the three-factoral variance analysis, the factors A, B, and C which influence the weft take-up were designated following:
A: r_1 - water pressure, and

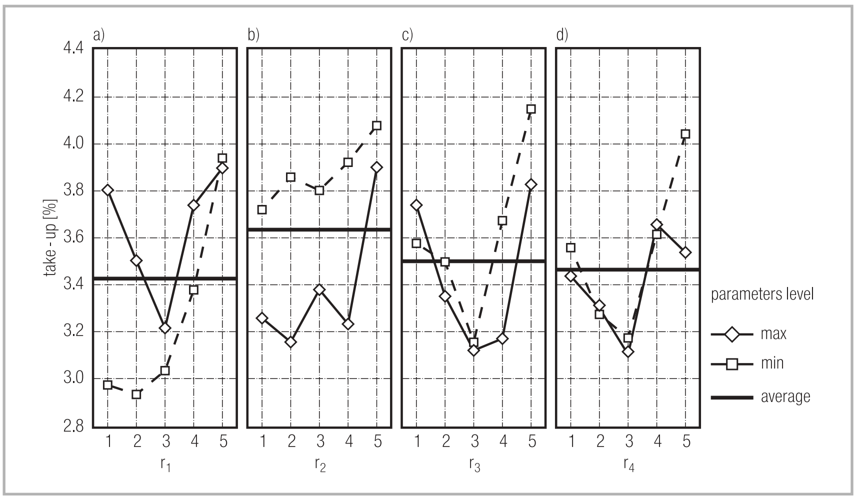

Figure 5. Influence of the parameters listed on the weft take-up distribution over the woven fabric width: a) air pressure in the main jet, b) air pressure in the subnozzles, c) time of the air exhaust from the subnozzles, d) value of braking force and of air pressure in the crimp removal jet.

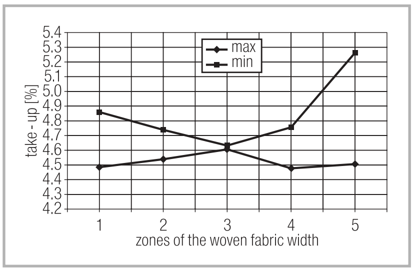

Figure 7. Weft take-up distribution over the woven fabric width as a function of maximum and minimum setting values of the picking mechanism.

r_2 - water portion volume,
B: s_1 - maximum parameter value, and
s_2 - minimum parameter value;
C: t_{1-5} - the succeeding zones of fabric width.

The estimation of take-up distribution has been elaborated identically to that of the pneumatic loom. The results of the three-factoral variance analysis for the NISSAN loom are presented in Table 6. As can be seen from the values all analysed factors fundamentally influence the formation of the fabric's weft take-up ($F>F_{kr}$) directly as well as trough interaction. The dependencies between the take-up values and the particular factors are shown in Figures 6-8.

Changing the pressure and water portion volume has an essential influence on weft take-up in the fabric. To achieve as small weft take-up as possible maximum pressure (r_1) and maximum water portion volume (r_2) should be set (Figure 6). When these parameters are set at minimum levels greater take-up values have been achieved.

The parameter setting level of the picking mechanism also has an essential influence on the fabric's weft take-up distribution ($F=7.19>F_{kr}$, $p<0.01$). When the parameters are set at minimum level, an increase in weft take-up in the border zones of the woven fabric could be observed. This phenomenon can be caused by smaller tension of the weft ends. The woven fabric manufactured at maximum settings is characterised by a more uniform take-up distribution over the fabric width.

When maximum water pressure (Figure 8a) is set at a constant volume portion exhausted from the stream jet, a smaller but statistically unimportant weft take-up in the fabric occurs ($F=1.6<F_{kr}$ greater at $p<0.176$). This is caused by intensive thread tensioning in the shed as a result of greater weft flight velocity.

Minimum water pressure setting achieves greater take-up values; at the same time, the character of take-up distribution over the fabric width changes.

The influence of the water portion volume on the weft take-up distribution over the woven fabric width is illustrated by the dependence in Figure 8b The results (however statistically unimportant) indicate that the water portion volume has greater influence on the weft take-up at the right side of the fabric's width, in the fourth and the fifth zones. The water stream of greater mass moves with a greater inertia force, and for this reason the thread does not decrease its flight velocity so rapidly after passing half the shed width.

Comparison of Weft Take-up Distribution in Woven Fabrics Manufactured with the Use of Pneumatic and Hydraulic Looms and Parameter Settings of the Picking Mechanism by a Master

The result analysis was performed with the use of a two-factoral variance analysis, accepting the kind of loom as the first factor (A):
R1 - PICANOL OMNI pneumatic loom, and
R2 - NISSAN hydraulic loom,

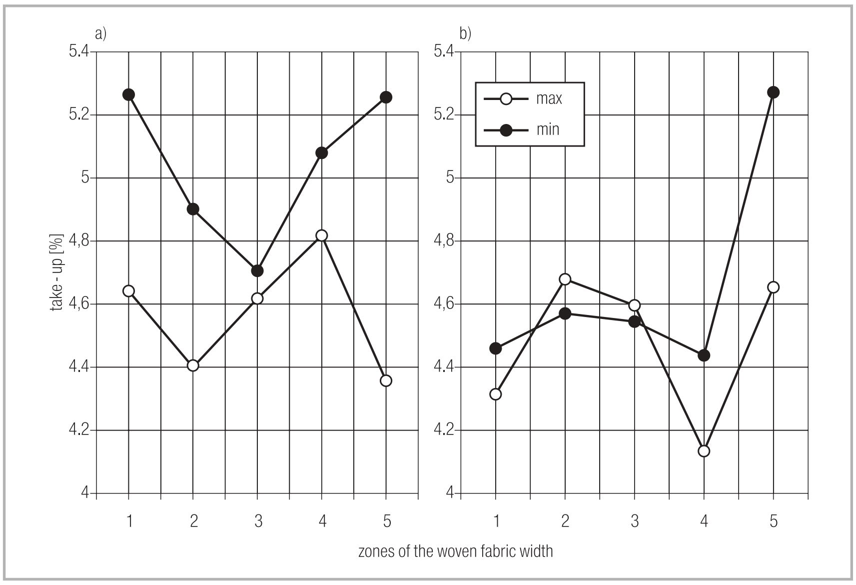

Figure 8. Influence of the parameters listed on the weft take-up distribution over the woven fabric width: a) value of water pressure, b) value of water portion volume.

Table 6. Results of variance analysis for the NISSAN hydraulic loom.

Factor or interaction	F-Snedecor statistic	Significance level
setting points (A)	25.53859	0.000001
parameter level (B)	51.04681	0.000000
woven fabric zone (C)	4.99916	0.000763
setting point - parameter level (AB)	9.83889	0.001996
setting points - woven fabric zone (AC)	12.15816	0.000000
parameter level - woven fabric zone (BC)	7.18557	0.000022
setting points - parameter level - woven fabric zone (ABC)	1.60186	0.175769

Table 7. Results of variance analysis for comparison of weft take-up.

Factor	F-Snedecor statistic	Significance level
loom (A)	1028.829	0.000000
woven fabric zone (C)	15.675	0.000000
loom - woven fabric zone (AC)	36.164	0.000000

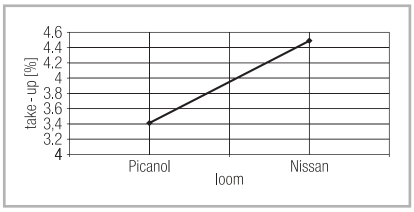

Figure 9. Influence of loom kind on the average value of weft take-up in the fabric.

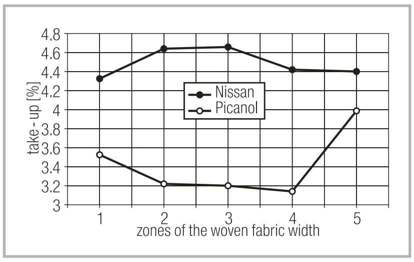

Figure 10. Weft take-up in the particular zones of the fabric width of fabrics manufactured with the use of PICANOL and NISSAN looms.

and the zones of fabric width as the second factor (C). The results of the analysis are presented in Table 7 and Figures 9 & 10.

The influence of the picking systems (the pneumatic and the hydraulic) on the average value of weft take-up in the fabric is illustrated in Figure 9 where are visible essential differences between the weft take-up values for both the looms are visible. These differences (NISSAN - 4.5%, PICANOL - 3.4%) most likely results from different parameters and conditions of weaving, i.e. the shed geometry, picking frequency, preliminary tension of warp and weft, beating-up angle, and differences in construction and equipment of the looms.

In the case of the master setting the picking mechanism's working parameters in a way he considered optimal, the weft take-up distribution in the particular zones differ fundamentally ($F=36.16>F_{kr}$, $p<0.001$), as can be seen in Table 7 and Figure 10.

The woven fabric manufactured with the use of the NISSAN hydraulic loom is characterised by a more uniform weft take-up distribution in comparison with the woven fabric from the PICANOL OMNI pneumatic loom. The weft take-up dispersion equals 0.34% for the hydraulic loom, and 0.84% for the pneumatic. On the basis of an analysis of the standard deviation S and the variability factor CV (Tables 2 and 4), we can determine the uniformity degree of weft take-up distribution in the fabric. From experiments carried out with the pneumatic loom, it results that the most uniform weft take-up distribution over the fabric width could be achieved applying minimum pressure of the subnozzles in the 5th experiment (CV=0.031%, S=0.122%). High uniformity was also achieved at maximum pressure setting in the crimp removal jet in the 8th experiment (CV=0.54%, S=0.186%). The highest degree of non-uniform take-up was achieved in woven fabrics obtained in experiments 1, 3, 6, and 7 (CV from 0.085% up to 0.115%, S from 0.292% to 0.276%) This was mainly influenced by setting the air pressure in the crimp removal jet to low, which caused an increase in the weft take-up value near the right selvedge of the woven fabric.

The woven fabrics manufactured with the use of the hydraulic loom are characterised by a greater uniformity of the weft take-up distribution over the fabric width (in experiments 10 to 13 the factor CV ranges from 0.03% to 0.048%, and the standard deviation S from 0.137% to 0.216%). An exception to this behaviour is the fabric manufactured in the 14th experiment, where a minimum water portion volume was set. This caused a velocity decrease in the weft over the final phase of flight and lower tension, and greater waving of the thread near the right fabric selvedge (CV=0.067%, S=0.313%) as an effect of these phenomena.

Conclusions

PICANOL OMNI pneumatic loom

1. Setting the longest time of air exhaust from the subnozzles results into a smaller average weft take-up caused by better thread stretching. However, care should be taken to avoid defibrillation and warp thread spreading by the exhausted air, which can form longitudinal stripes on the fabric. On the other hand a shorten exhaust time contributes to a greater weft take-up, which in extreme situations can cause loop formation at both fabric sides as an effect of excessive weft thread waving in the shed.

2. High air exhaust pressure from the subnozzles causes thread flight through the shed with high velocity and intensive thread stretching which in turn results in smaller take-up. However, additional care should be taken, because high flight velocity can lead to weft breakage at extreme situations.

3. When a minimum level of air pressure in the main jet is set, an increase in the air flow is achieved (indirectly, through the AIC-Q); this causes a more intensive tensioning of weft in the shed, which in turn results in its smaller take-up.

4. Setting maximum braking force in the PFT weft brake causes total weft braking in the final phase of the flight. This gives a distinct thread stretching effect, and moreover prevents thread breakage thanks to thread tension decrease at the moment of its stoppage, as a result of the action of the electromagnet pin on the weft supply assembly.

5. High air pressure in the crimp removal jet makes better suction of the weft end possible, which causes weft stretching. At the same time, this prevents weft thread removal inside the shed, which decreases the weft take-up in that zone of the fabric width which is opposite to the main jet.

NISSAN hydraulic loom

1. Maximum water pressure gives the thread higher flight velocity, and causes stretching of the thread which in turn results smaller take-up. However, at high water pressure danger of weft thread breakage exists On the other hand low water pressure can cause the formation of incomplete weft flights.

2. The water portion volume influences the weft take-up in the woven fabric at the right side of the fifth zone. According to expectation, a great mass of the water stream decreases the weft take-up as a result of higher thread velocity in the shed.

To summarise the considerations presented in this article, it can be stated that in order to achieve a uniform structure of a woven fabric, the best solution for weaving with the use of a pneumatic loom is to apply high air pressure in the crimp removal jet or low pressure in the subnozzles. When weaving with the use of a hydraulic loom, it is best to set a great volume of the water portion.

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References

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