SEAM PRESSING PERFORMANCE

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Abstract: *In garment manufacturing, pressing is one of the latest stages of production. The purpose of the pressing is to achieve a smooth appearance of the shell fabric and flat and smooth seams. A group of woven fabrics with of fiber composition 100% cotton, cotton/Lycra, 100% wool and blended wool/PES for production of men's shirt and tailored garments were tested for seam pressing performance on a FAST 4 press test. The relationship of the seam crease angle after pressing with the fabric fiber composition and fabric weight and end use. The substantial difference between fabric end use and seam pressing performance was analyzed. The fabrics of Wool/PES fabric composition have shown best seam crease performance out of all fabrics for tailored garments. Cotton/Lycra fabrics have shown superior seam pressing performance compared to 100% cotton fabric for men's shirt.*

Keywords: pressing performance, FASTpress-tester, crease pressing angle, woven fabric.

PERFORMANSE PRESOVANJA ŠAVA

Apstrakt: *U proizvodnji odeće presovanje je jedna od poslednjih faza proizvodnje. Svrha presovanja je postizanje glatkog izgleda površine tkanine i ravnih i glatkih šavova. Kod grupa tkanina sirovinskog sastava 100% pamuk, pamuk/likra, 100% vuna i mešavina vuna/PES za proizvodnju muških košulja i muške stilske odeće je ispitivan kvalitet presovanja šavova. Analiziran je odnos ugla šava posle presovanja sa sirovinskim sastavom, površinskom masom, odnosno namenom tkanina. Od svih tkanina za stilsku odeću, tkanine sirovinskog sastava vuna/PES za muško odelo su pokazali najbolja svojstva šava posle presovanja. Tkanine za muške košulje od pamuka i likre su pokazale superiorna svojstva šavova posle presovanja u odnosu na tkanine od 100% pamuka.*

Ključne reči: svojstva presovanja, FAST pres tester, ugao presovanja šava, tkanina.

1. INTRODUCTION

The production of high quality clothing is the result of several combinations of design, style, and choice of fabrics, tailoring, sewing and finally successful pressing. In the processes of laundry, dry cleaning and clothing production processes in the clothing industry, steam pressing is a very important process. In order to give the garment folds, shape, flatness and other attributes, pressing is the final opportunity to achieve this. Pressing conditions have been investigated by many researchers to obtain optimal steam pressing parameters [1-4]. In practice, it has been shown that the pressing temperature in the narrow range is limited. Steam pressing, whether in the traditional way with wet fabric and iron or with live steam in woolen fabrics, is a very important and old process that is introduced as a temporary set. In practice, large variations in garment pressing efficiency are achieved, so there are many different opinions to define the conditions that will give the best results. Very little is known about the steam pressing process from a technological point of view. In the above mentioned studies it can be seen that the degree of setting was not measured. Therefore, it seems that there are no studies that have considered the effect of steam on woolen clothes, i.e. the influence of certain parameters such as temperature, time and moisture reclaim.

Grever [5] describes improvements in the presser head for feeding steam and distributing steam into the garment while in contact with the head. Polinski and Wieczlak [6] investigated to what degree it is possible to control the pressure field of closed-type

presses and the role of the lining in shaping the pressure field. As a result, method of investigation of the pressure field has been developed and the effect of physical properties of the most common linings on the formation of the pressure in selected press types has been assessed.

Le *et al.* [7] researched the performance of pressing on woolen fabrics, using the effects of different temperatures with decatising treatment and regains fabrics. The results shown that the pressing performance was strongly affected by fabric regain and by the level of set imparted during decatising treatments. It was proposed that the pressing performance of a wool fabric is comprised of two components: temporary and permanent.

Ly *et al.* [8] in their study evaluate the clothing appearance after steam pressing of light fabrics. Tester *et al.* [9] have found that a significant factor for the clothing appearance is crease angle by weft direction. Pressing a garment made of pure wool, which is of high quality, is one of the final processes in the production of clothing. Fan [10] investigated of the relationship between the crease recovery and pressing for wool and other fabric types. It was found that there is a weak relationship between the crease recovery measured by Shirley Crease Recovery Tester and Siro-Press Tester. Also, some characteristics of woolen fabrics that have a good pressing effect and good recovery were identified.

Biglia *et al.* [11] investigated the relationship between the press angle and the dimensional properties and the low stress mechanical properties. From this relationship they found that relatively higher hygral expansion and relaxation shrinkage tend to result in better pressing performance i.e. lower press angle. The effect of shear stiffness can be balanced with the effect of bending stiffness in practice.

Wang *et al.* [12] investigated the press performance of a range of wool and wool blend fabrics with the aid of a temperature adjustable hand steam iron, a domestic ironing board and a thermocouple digital temperature display. It was found that for press duration of 10 seconds, the fabric crease angle is reduced with the increasing press temperature. For all tested fabrics it was found that the largest reduction of the crease angle in the temperature range from 80° C to 120° C. Minazio [13] describes that instrumentation and test method. The result of the pressing performance test is an angle, the smaller the angle the better the pressing performance. Also, weft crease angle and warp formability have been shown to be strongly related to important aspects of the appearance of a finished garment for high quality, tailored, men's suits. Undesirable blown' appearance occurs as a result of poor retention of the folds on the seam after pressing. Biglia *et al.* [14] conducted industry and laboratory research where they studied the relationship between fabric properties and clothing appearance and developed a simple measurement of crease angle as an indicator of the pressing effect. They stated that the crease angle should be smaller but not a sufficient condition for to get a good seam appearance after pressing. They also concluded that using FAST set instruments can measure the formability of fabrics in combination with crease angle.

The aim of this paper is to analyze the pressing properties such as crease angle after pressing of various types of fabrics. The tests were performed on 25 fabrics intended for making different types of clothes, such as men's shirt, top coat and men's suit using by FAST press tester.

2. MATERIALS AND METHOD

2.1. Materials

A group of 25 fabrics of different fiber composition for various garment types and end use were investigated for seam pressing performance (Table 1). The first group of fabrics was cotton-type fabrics of fiber composition 100% cotton. The second group are cotton/Lycra fabrics intended for men's shirt. The fabric weight range for 100% cotton and cotton/Lycra fabric for men's shirt is similar and goes from about 100 to 160 g/m^2. The following groups of fabrics are 100% wool and wool/PES fabrics, of various fabric weight intended for various tailored garments. The third group of wool fabrics (W1, W4, and W5) is heavy fabrics for top coats, woolen type, having fabric weight from 364 to 380 g/m^2. The fourth group of fabrics (W6 to W10) is 100% worsted wool fabrics for men's suit, of fabric weight ranging from 155-224 g/m^2. The last group no. 5, are also worsted fabrics for tailored garments of wool/PES composition.

2.2. Method

The fabric seam pressing performance was investigated by FAST press tester. The test applied is IWTO TM 42-02 "Crease pressing performance test", approved by International Wool Textile Organization [15]. The instrument is intended to predict the effect of fabric seam pressing performance before production. The pressing units consisting of pressing device and hot water jug are shown in Figure 1. Figure 2 shows the optical device used to measure crease angles after pressing.

Table 1: Investigated fabric particulars

Fabric group	Fabric designation	Fiber Composition	Fabric weight Q, g/m^2	Types of garment
1	CO1	100% cotton	129.14	Men's shirt
	CO2		124.55	
	CO3		139.88	
	CO4		109.33	
	CO5		125.32	
	CO6		152.15	
	CO7		126.71	
	CO8		133.90	
	CO9		158.75	
	CO10		133.40	
2	COEL1	94% cotton 6% Lycra	154.85	
	COEL2		157.89	
	COEL3		138.43	
	COEL4		101.17	
	COEL5		128.91	
3	W1	100% wool (woolen)	380	Top coat
	W4		364.3	
	W5		374.1	
4	W6	100% wool (worsted)	199	Men's suit
	W7		224	
	W8		155	
	W9		165.1	
	W10		157.2	
5	WPES2	55% wool 45% PES (worsted)	212.8	
	WPES3		207.9	

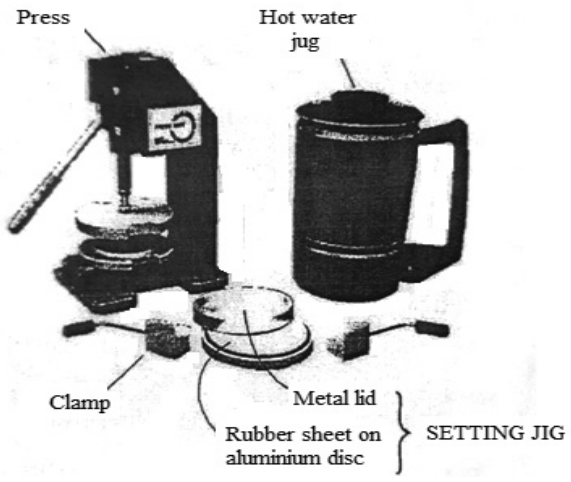

Figure 1: Crease setting device

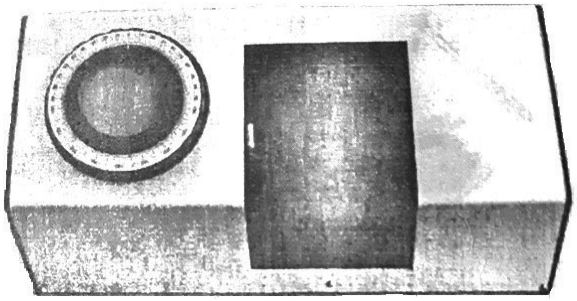

Figure 2: Optical device for measure crease angle

The sample are prepared according IWTO TM 42-02 standard. Six test specimens with 4 cm x 2 cm dimensions were cut from each fabric, i.e. three samples in the warp direction and three samples in the weft direction. The specimens are folded in half so that the formed crease is parallel to the shorter side, with the back of the fabric inside the fold. After that, the samples are placed in the setting jig and immersed in boiling water of water jig. After the specimens are removed from the jig, they are left under standard conditions for 24 hours to recover before measuring the crease angle by optical device.

The purpose of garment pressing is giving a smooth, rigid look to the panels and seams. If pressing is not satisfactory, the seams do not lie flat, but tend to rise and inflate. This phenomenon is described as seam opening or seam blowing, which can make garments unattractive (Figure 3). The lower the seam-pressing angle, the better is the seam pressing performance or seam appearance.

Figure 3: Seam quality after pressing

3. RESULTS AND DISCUSSION

The results of the crease angle (CA) of the investigated fabrics for men's shirt and for tailored garments in warp and weft direction after steam pressing are shown in Table 2 and Table 3.

The crease angle of 100% cotton fabrics is higher than cotton/Lycra fabric. This means that cotton/Lycra fabrics show better seam pressing performance than 100% cotton one. For the wool and wool blend fabrics, it is noticeable thatwool/PES fabrics for tailored suitsobtain the lowest pressing angles. In addition, the 100% wool fabrics for topcoat have lower pressing angles (better pressing performance) compared to 100% wool fabrics for men's suit.

Table 2: Pressing crease angle of fabrics for men's shirt in warp and weft direction

Fabric	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8	CO9	CO10	COEL1	COEL2	COEL3	COEL4	COEL5
CA warp, °	87	127	114	56	78	99	70	44	117	71	37	36	45	73	42
CA weft ,°	62	111	113	68	87	109	67	35	107	67	40	56	40	51	38

Table3: Pressing crease angle of fabrics for men's tailored garments in warp and weft direction

End use	Top coat			Men's suit						
Fabric	W1	W5	W6	W7	W8	W9	W11	W12	WPES2	WPES3
CA warp, °	81	49	83	120	74	121	107	120	48	52
CA weft , °	84	47	82	108	73	117	105	110	52	41

The Figure 4 shows the change in crease angle by warp and weft with increasing fabric weight for 100% cotton fabrics. The fabric weight values (vertical bars) are arrangedfrom lowest to highest. The crease angles (dots) along the warp and weft move approximately from 40° to 160°. The crease angle by weft is somewhat lower than the warp one. There is clear tendency of decreasing crease angle with increasing fabric weight from sample CO2 to CO8 but not for a whole range of fabrics. The best seam pressing performance shows CO8 sample having angle of 35° and 44° per weft and per warp. The smaller the crease angle, the better is the seam holds the pressed edges and there will be no seam blowing. Generally, according to the limit values of the FAST control cards, 40° is considered to be the critical value for best seam properties,

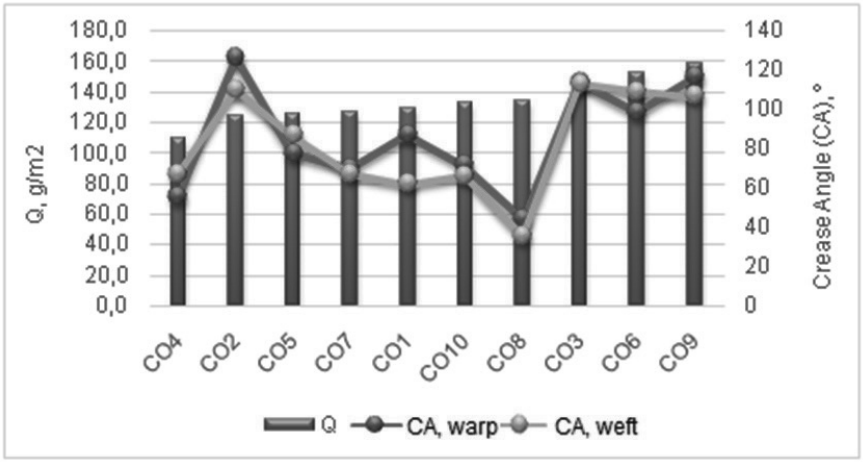

Figure 4: Crease angle (CA) and fabric weight of cotton fabric

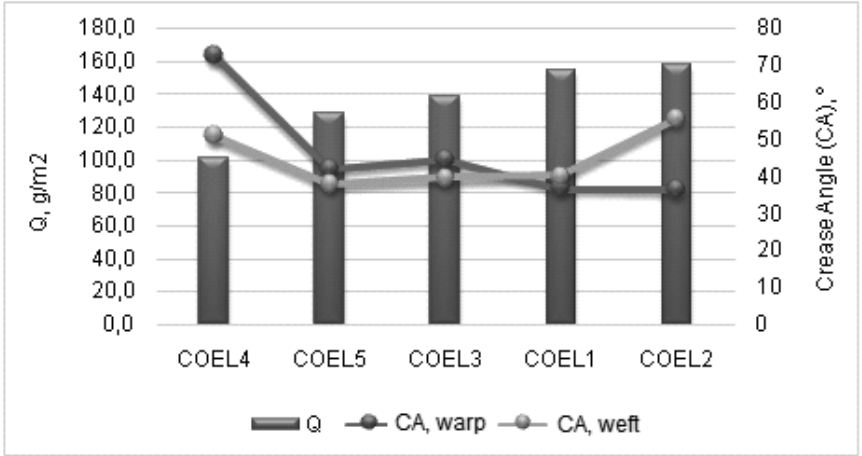

Figure 5: Crease angle (CA) and fabric weight of cotton/Lycra fabrics

while the values above this are considered not having good pressing properties.

Figure 5 shows the change of crease angle by increasing the fabric weight of cotton/Lycra fabrics. The graph shows that there is a clear trend of decreasing the crease angle by increasing of fabric weight for the warp samples.

In terms of seam pressing performance, cotton/Lycra samples show better performance than 100% cotton one, because they have lower crease angles, which clearly suggest high quality in terms of pressing and retention properties of the formed folds during pressing.

The 100% wool and wool blend samples pressing crease angle is shown in Figure 6. The samples are differentiated in respect of fiber composition and end use. The first group of samples (W9 to W8) of 100% wool for men's suit show trend of decreasing crease angle with increasing fabric weight. The second group of fabrics of 100% wool for top coats (W5 to W1) has lower creasing angles and show better pressing performance than the 100% wool fabrics for men's suit. The third group is fabrics of wool/PES composition for men's suit have the lowest crease angle of 40° to 50°, and consequently the best seam pressing performance, which suggests a good appearance of pressed seams, and finished garment. In general, all three groups of fabrics have somewhat lower weft crease angles, which suggest better seam pressing performance this direction.

The results of the one-way analysis of variance (Table 4) confirms that the fiber composition/fabric end use have significant effect on the pressing performance of the seams. Figure 7 shows the difference of pressing crease angles in weft direction for all type of investigated fabrics. The worst performance regarding seam pressing properties are found for 100% wool fabrics for men's suit. The best performance show wool/PES fabrics for men's suit and cotton/Lycra fabrics for men's shirt.

4. CONCLUSION

The seam pressing properties of a several groups of fabrics with different fibre composition and garment end use have been investigated on a FAST press tester.

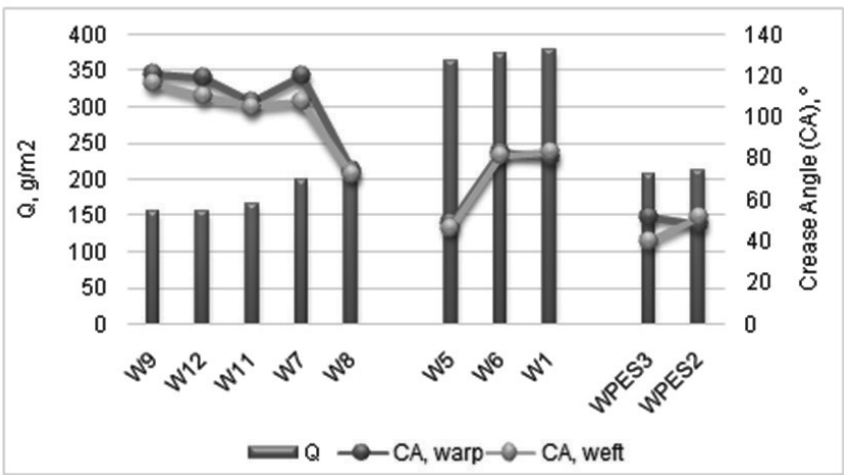

Figure 6: Crease angle (CA) and fabric weight of wool and wool/PES fabrics

Table 4: Results of one-factor analysis of variance for the influence of fiber composition and garment type on crease pressing angle in warp direction

Effect	SS	Degree of freedom	MS	F	p
Intercept	98479.18	1	98479.18	197.5680	0.000000
Garment type/ Fibrecompositon	11946.23	4	2986.56	5.9916	0.002447
Error	9969.14	20	498.46		

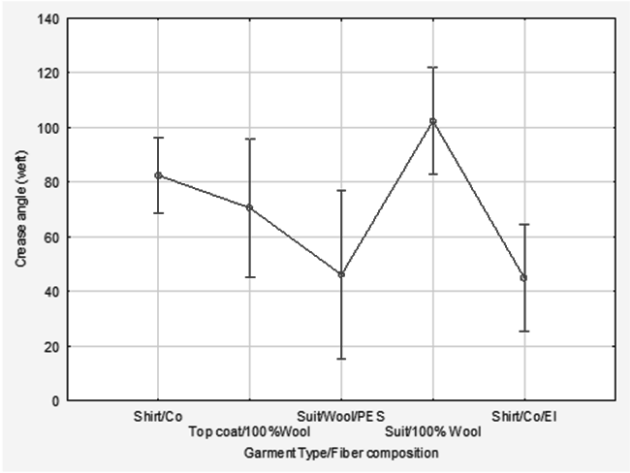

Figure 7: Crease angle by weft direction of cotton and cotton/Lycra fabrics

Generally, investigated samples show tendency of decreasing pressing crease angle with increasing fabric weight.

Cotton/Lycra fabrics show much better performance, than 100% cotton fabrics for men's shirt, having lower pressing angle, which clearly suggest high quality in terms of pressing and retention properties of the formed creases during pressing.

The best properties of fabrics for men's tailored garments show blended wool/PES fabrics, having crease angles in both directions between 40° and 50°.

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