ВЛИЯНИЕТО НА БАГРЕНЕТО НА ОБЛЕКЛА ВЪРХУ ЕФЕКТИВНОСТТА НА ШЕВА

Горан ДЕМБОСКИ, Марина БОСКОВСКА
Университет Св. св. Кирил и Методий - Скопие, Факултет по технология и металургия, катедра Текстил, ул. Руджер Бошкович 16, 1000 Скопие, Република Македония
e-mail: goran@tmf.ukim.edu.mk

THE INFLUENCE OF GARMENT DYEING ON SEAM PERFORMANCE

Goran DEMBOSKI, Martina BOSKOVSKA
University "Ss. Cyril and Methodius"-Skopje, Faculty of Technology and Metallurgy, Department of Textile, Rudjer Boskovic 16, 1000 Skopje, Republic of Macedonia
e-mail: goran@tmf.ukim.edu.mk

ABSTRACT

Garment dying offers flexibility in differentiation the winning seasonal colors in apparel supply chain, lowers production costs and reduces inventory. During the dyeing process, the garment is exposed to mechanical and chemical action, which leads to a change of particular garment properties, possible occurrences of defects and decreasing of quality.

A range of fabric samples for shirts and trousers were exposed to garment dyeing treatment using two different dyeing procedures: dyeing with reactive and dyeing with pigment dyes. Two types of seams were applied for seaming the cutting parts: superimposed and lapped seam.

The influence of the garment dying treatment type on seam performance was investigated.

The results show that the decreasing of seam strength of reactive dyed garments is greater than the pigment dyed one. The average seam strength decreasing for both investigates seams types is 14.6% for reactive dyed and 5.9% for pigment dyed garments. Comparison of seam failure mechanism showed difference between referential and garment dyed samples.

Key words: *readymade garment dyeing, seam, seam class, reactive dyes, pigment dyes*

INTRODUCTION

Clothing has always been a permanent part of human living and culture. The garment industry features a variety of fashion products to satisfy specific market demand. Because the today apparel market is regarded highly competitive, the apparel companies in striving to remain competitive on the market relay manly on the issues generally connected to quality and innovation and not merely on squeezing prices. Within this aspect, the features of row materials, garment performances and quality become very important.

In general, the garment is manufactured from previously colored materials. The quantities of dye for certain product are purchased before the dyeing process which negatively impact supply chain management and quick response to market demands.

Today, when the lead time to the market is essential for positioning and success, the coloring of readymade garment is frequently employed by manufacturers. In order to differentiate winning season colors, it is possible to react much more efficiently towards market demands if the garment is colored after manufacturing. This includes the manufacturing of garment from uncolored materials and trims and coloring after manufacturing.

For successful accomplishment of readymade garment coloring process, the particular attention should be devoted to issues such as: readymade garment preparation for coloring, materials shrinkage during the wet processing, the selection of sewing threads, linings, interlinings and other trims.

The researches in the part of wet garment processing point out to possible appearing of defects, the declining of properties, garment damaging, as well as the need of preventive measures to control the process due to possible diminishing of added value [1, 2]. In the field of readymade garment coloring, the investigations have been made on influence of finishing with direct dyes on the properties of various types of seams, on colored and uncolored garments. It was found that there is diminishing of seam properties after coloring and the influence of stitch density on seam performance [3]. The researching of sewing threads damaging suggests on 30 до 40% loss of strength of needle cotton sewing threads during the stitch forming action and on differences in the degree of thread damage related to sewing thread fibre composition and fabric structure [4]. The potential problem in manufacturing colored readymade garment is possibility of seam puckering appearance in application of cotton sewing thread of high diameter. It was shown that seam puckering is related to laundering and drying, as well as to the seam construction [5, 6].

The objective of the paper is further investigation of properties of seam after readymade garment dyeing with reactive and pigment dyes.

EXPERIMENTAL

A range of 100% cotton woven fabrics for manufacturing of readymade garment colored shirts and trousers has been investigated. The investigated samples are dyed with pigment and reactive dyes. The features of investigated samples fabrics are depicted in ***Table 1***.

Table 1

The properties of the fabrics for readymade garment dyeing

Designation	Fibe composition	Weave	Fabric weight, g/m^2
Shirt fabric			
S1	100% cotton	Plain	111.8
S2	100% cotton	Plain	123.3
S3	98% cotton 2% elastane	Plain	145.7
S4	98% cotton 2% elastane	Twill	187.2
Sf12	100% cotton	Plain	204.3
Sf14	100% cotton	Plain	224.3
Sf19	100% cotton	Plain	252.8
Trouser fabric			
T1	100% cotton	Twill	198. 5
T2	100% cotton	Twill	269.1
T3	98% cotton 2% elastane	Twill	280.6
T4	98% cotton 2% elastane	Twill	287.4
Pocketing fabric			
P1	100% cotton	Plain	73.9

Sewing thread of 100% cotton was used for seaming, with defined thread count, needle size and stitch density. The seams types of class 1 and 2 are chosen for seaming garment panels, since these types of seams are most frequently used in sewing this kind of products: seam type of class 1 (superimposed), stitch type 301 and seam type of class 2 (lapped), stitch type 2x401 (***Figure 1***). For the sample P1, which is used for construction of pockets, the stitch type 401.504 (safety stitch) is used since this type of stitch is frequently used in sewing pockets.

After seaming the samples are subjected to the process of dyeing. The special preparation of the samples is done by connecting them in larger samples. The samples are dyed with pigment and reactive dyes in industrial environment.

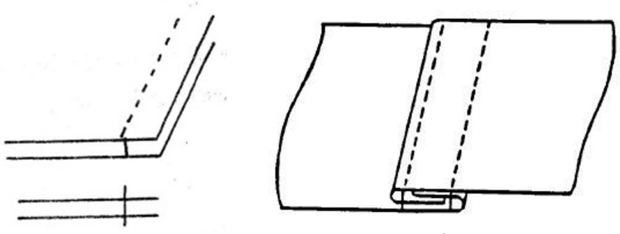

Figure 1 Seam types of class 1 (a) and class 2 (b)

After dyeing process, the samples have been investigated on fabric and seam strength by EN ISO 13934-1 and EN ISO 13935-2 on Tinius Olsen H5KT SDL Atlas tensile tester.

RESULTS AND DISCUSSION

The results of seam efficiencies as of referential samples for seam class 1 and 2 in both directions are shown in ***Table 2***.

Table 2
Seam efficiency of referential samples

Designation	Seam efficiency (%)			
	Class 1 (warp seam)	Class 1 (warp seam)	Class 2 (warp seam)	Class 2 (warp seam)
Shirt fabric				
S1	65.5	84.8	104.2	113.1
S2	43.9	/	107.0	/
S3	40.4	/	91.4	/
S4	27.2	87.1	83.9	116.0
Sf12	88.6	76.6	96.7	105.7
Sf14	89.2	35.3	98.4	88.9
Sf19	101.3	28.4	104.9	63.3
Trouser fabric				
T1	31.5	75.0	87.6	97.7
T2	45.2	60.4	104.9	111.5
T3	56.4	51.7	114.1	98.5
T4	37.7	51.0	90.1	98.4
Pocketing fabric				
P1 (301)	78.7	79.7	/	/
P1 (401, 504)	88.2	80.1	/	/

The results obtained for seam class 1 show big differences in seam efficiency values ranging from 27.2 to 89.2%. The efficiency of seam class 2 is much higher and ranges from 63.3 to 116%, which means the strength of the seams obtains values much closer to fabric strength. Some samples have the seam strength higher than fabric strength. So the seams of class 2 can provide higher quality of in terms of seam efficiency.

The figures 2-5 show the strength of the seams for referential, reactive dyed and pigment dyed garments for seams of class 1 and 2 seamed in warp

and weft direction. The results show that after garment dyeing processes the seam strength decreases.

The decreasing of class 1 seam strength in both seaming directions is found for both types of dyeing treatments.

For the seams of class 1 in weft direction, the average seam strength decreasing compared to referential samples is 15.8% for reactive dyed samples and 5.5% for pigment one. For the same class of seams in warp direction, the reduction of the seam strength is 13.2% for reactive and 6.4% for pigment dyed one.

Both seam types obtain similar values of strength reduction after dyeing with reactive dyes: the seams of class 1 show strength reduction from 9.9% to 29.4%, while the seams of class 2 the reduction of strength is from 9.9% to 26.0%.

In general, the pigment dyed samples show lesser strength reduction compared to reactive dyed. On average, for both seam types, the strength loss after reactive dyeing is 14.6%, while after pigment dyeing it is 5.9%. So, much higher reduction of seam strength is found for reactive dyed garment.

Opposite to reactive dyeing, pigment dyeing garments show different strength reduction regarding seam class: for the seams of class 1, the percent of reduction ranges from 0.3% to 15.9%, while for the seams of class 2 it ranges from 1.0% to 6%. So, the seams of class 2 show lesser strength loss than seams of class 1.

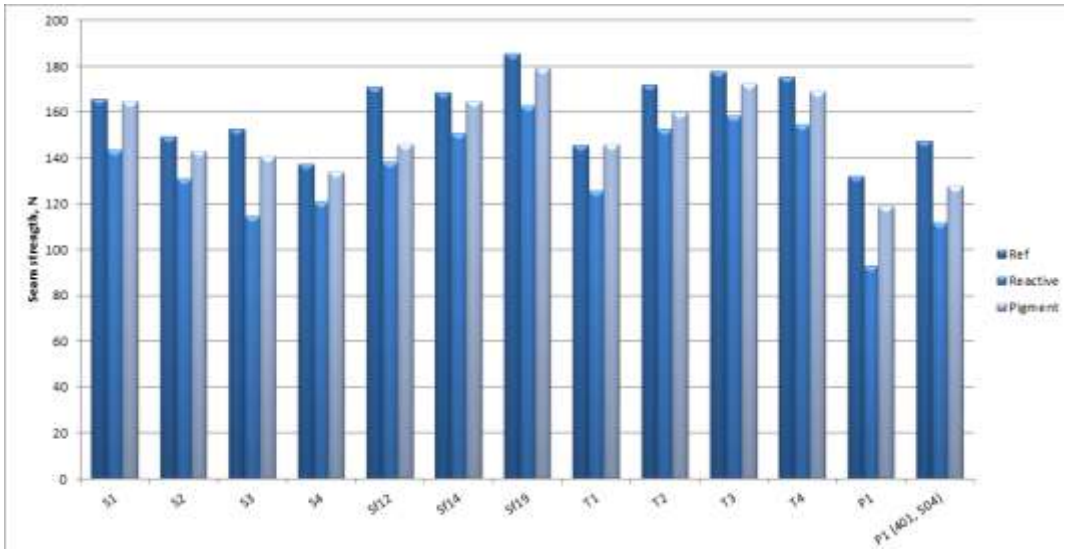

Figure 2 Seam strength of referential samples, seam class 1, warp seamed samples

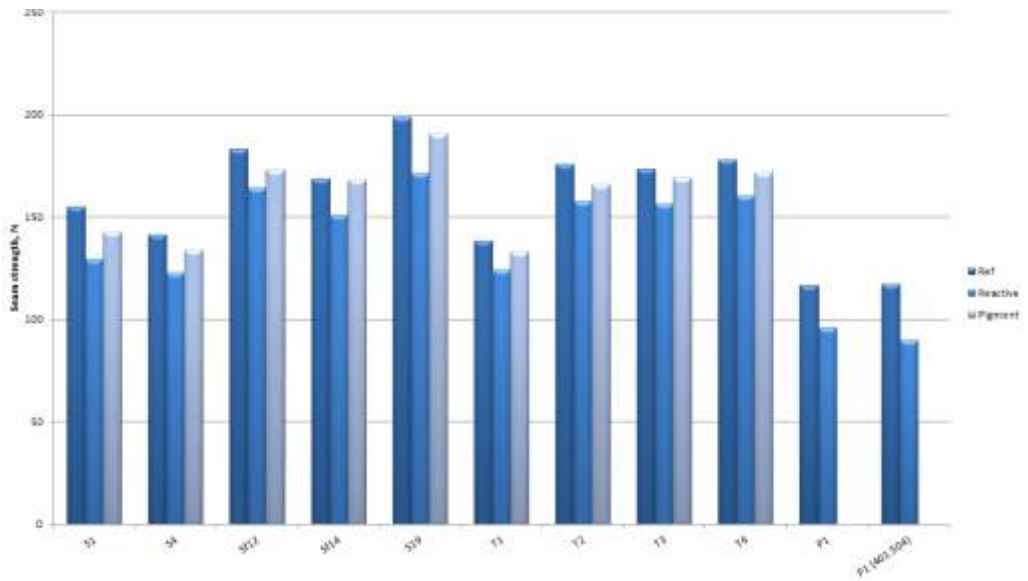

Figure 3 Seam strength of referential samples, seam class 1, weft seamed samples

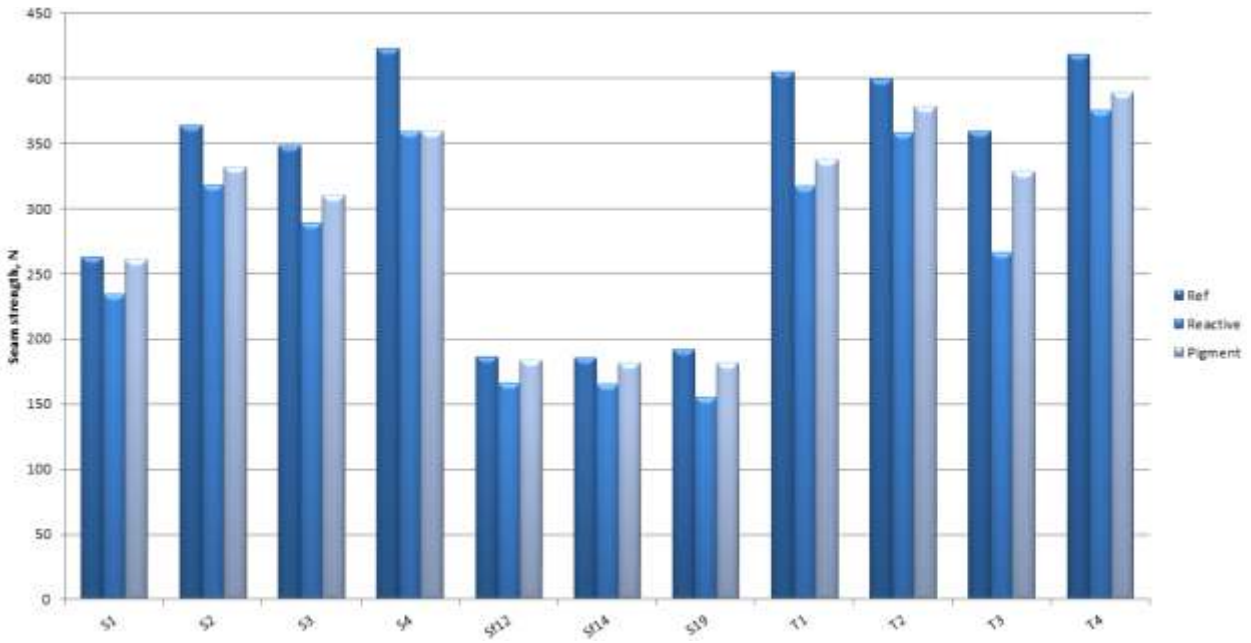

Figure 4 Seam strength of referential samples, seam class 2, warp seamed samples

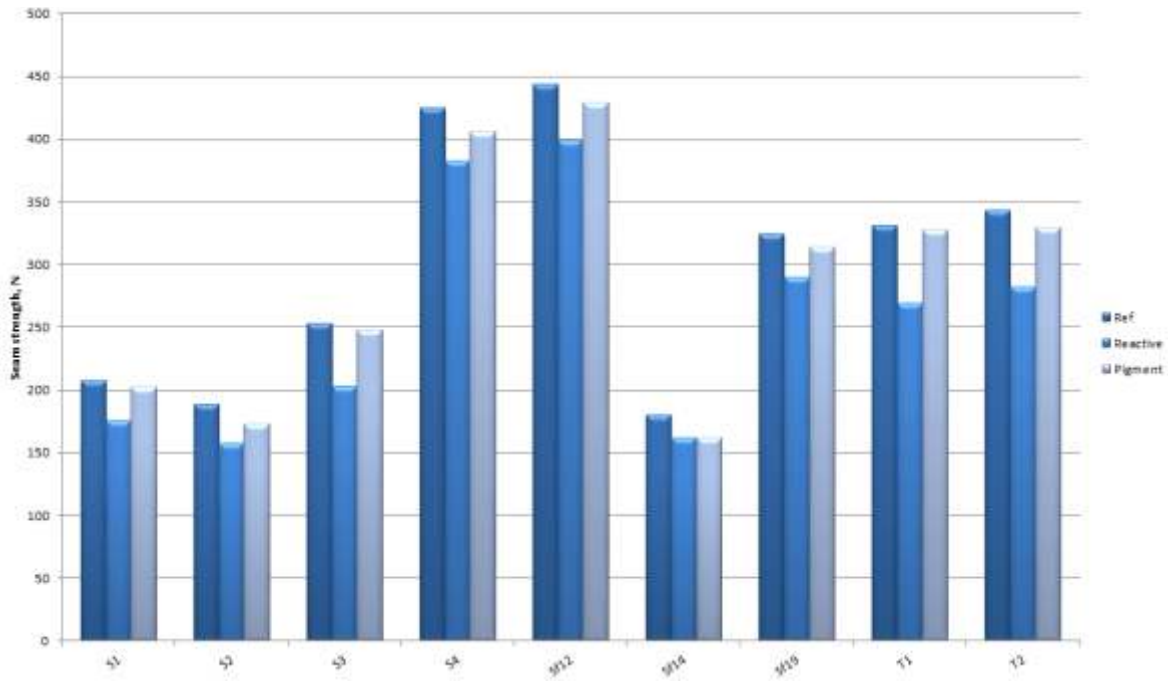

Figure 5 Seam strength of referential samples, seam class 2, weft seamed samples

The seam break can be result of thread break in the seam, the fabric break, or both. For referential samples, the breaking of the seam was found to be a result of breaking of sewing thread and breaking of fabric. For reactive dyed samples, there are cases where the breaking of the seam is result of only breaking of thread. The same is observed for pigment dyed samples but in fewer cases.

CONCLUSION

The seam efficiency of referential samples ranges from 27.2 to 89.2% for seam of class 1 and from 63.3 to 116% for seams of class 2.

The reactive dyed garments show greater decreasing of seam strength compared to pigment dyed.

For weft direction seams of class 1, the average seam strength loss is 15.8% for reactive dyed samples and 5.5% for pigment one. For warp direction seams of the same class, the loss of strength is 13.2% for reactive and 6.4% for pigment dyed one

The dyeing with reactive dyes results in similar reduction of seam strength for both types of seams: from 9.9% to 29.4% for superimposed seams of class 1 and from 9.9% to 26.0% for lapped seams of class 2.

The average seam strength loss for both seam classes is 14.6% for reactive dyed and 5.9% for pigment dyed garments.

Comparison of seam failure mechanism showed difference between referential samples and reactive and pigment dyed samples.

REFERENCES

[1] B. Mangovska, I. Jordanov, G. Demboski, Influence of Wet Finishing on Appearing and Number of Deffects, as well as on Structural Mechanical and Hygienic Properties, *Tekstilna industrija*, Vol. 60, 2, 2012, 11-21,

[2] D. Saravanah, Journal of the Institution of Engineers (India), Part TX: Textile Engineering Division 89:14-19, January 2009

[3] Farhana K. et al. (2015) "Comparison of seam strength between dyed and un-dyed gabardine apparels: A research on lapped and superimposed seam", J Textile Sci Eng, 5:5,

[4] V.K. Midha *et al*., Effect of Workwear Fabric Characteristics on the Changes in Tensile properties of Sewing Threads after Sewing, Journal of Engineered Fibres and Fabrics, **5**, 1 – 2010, 31-38

[5] F. FS Ebrahi, The Impact of Sewing Threads Properties on Seam Pucker, J. Basic Appl. Sci Res., 2 (6) 5773-5780, 2012

[6] E. Toshikj, G. Demboski, I. Jordanov, B. Mangovska, Influence of Seam Type and Laundering on Seam Puckering and Functional Properties of Cotton/Polyester Shirt Fabrics, *AATCC Review*, Vol. 15, March/April 2015, No 2, 41-49