INVESTIGATION OF THE EFFECTS OF FIBRE CONTENT AND WEAVING MACHINE PARAMETERS ON THE DIMENSIONAL STABILITY PERFORMANCE OF THE FABRIC BEFORE AND AFTER FINISHING

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EXTENDED ABSTRACT
In this study, it was aimed at detailed investigation of the parameters (fibre content, fixing type and weaving looms type) that affect shrinkage test, elasticity, residual extension and fabric width of the woven fabric. With this aim, in the study, 18 different types of 3/1 S twill fabrics were weaved by choosing 3 different blends, 2 different fixing situation of the yarns (fixed and non-fixed yarn) and 3 different weaving looms (itema and picanol-rapier weaving machine, zax- air jet weaving machine). Pre-treatment processes were done for all the fabrics, and the fabrics were dyed by impregnation method at the same reactive dyeing recipe. A set of tests such as (shrinkage test, elasticity, residual extension etc.) were employed the fabrics in the study. The data from the tests were analysed statistically. According to the variance analyses with the 95% confidence range, it was observed the fibre content was not significant ($p>0,05$) while fixing situation of the yarns and weaving loom type were significant ($p<0,05$).

Key Words: Fibre content, weaving machine parameters, dimensional stability, finishing

1. INTRODUCTION

The dimensional stability is very important performance for a woven fabric, and different process is applied to the fabric in order to prevent this problem such as compacting. However, the finishing process is not single reason for dimensional stability but also the type of fiber and weaving machine, the fixing of the yarn are effective factors. Therefore, the interaction between them must be known in order to prevent this problem. In this research, the reason of dimensional stability was investigated in terms of fibre content, weaving machine and blends of fibre. In order to determine, shrinkage test, elasticity, residual extension were measured.

2. MATERIAL AND METHOD

2.1 Material

In the scope of this study, three different cotton fibre content were used and they were Turkmen, Urfa and Brasil. Ne 20/1 containing 78 dtex elastane weft yarn were used with or without fixed to see effects on the dimensional stability. Ne 30/1 Compact yarn was used in the woven fabric.

2.2 Method

From these weft and warp yarns, 3/1 s twill woven fabric were produced, and the density of the weft and warp were 30/1 cm and 59/1 cm respectively. Weaving loom machine rpms were 600, 550 and 500 for zax, itema and picanol respectively.

2.3 Test and analyses

A set of tests such as (shrinkage test, elasticity, residual extension etc.) were employed the fabrics in the study. Moreover, the results from these tests were analysed statistically with the 95% confidence range.

3. RESULTS AND DISCUSSINOS

The % shrinkage of the fabric on the weft range from -32% to -37 in Table 1. It was seen that % shrinkage could change depending on the fixing situation of the weft yarn.

Table .1 Sample identification and % shrinkage value

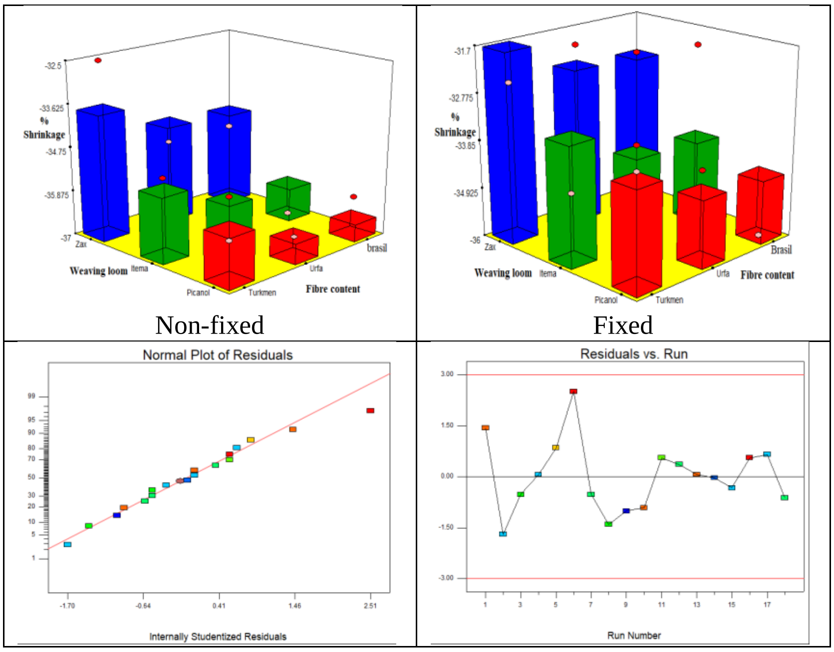
Sample	Fiber content	Fixing situation	Weaving loom	Shrinkage (%)
Type 1	Turkmen	Non-Fixed	Picanol	-36
Type 2	Urfa	Non-Fixed	Picanol	-36,5
Type 3	Brasil	Non-Fixed	Picanol	-36
Type 4	Turkmen	Non-Fixed	İtema	-35
Type 5	Urfa	Non-Fixed	İtema	-36
Type 6	Brasil	Non-Fixed	İtema	-37
Type 7	Turkmen	Non-Fixed	Zax	-32,5
Type 8	Urfa	Non-Fixed	Zax	-35
Type 9	Brasil	Non-Fixed	Zax	-35
Type 10	Turkmen	Fixed	Picanol	-33
Type 11	Urfa	Fixed	Picanol	-34
Type 12	Brasil	Fixed	Picanol	-36
Type 13	Turkmen	Fixed	İtema	-34,5
Type 14	Urfa	Fixed	İtema	-34,5
Type 15	Brasil	Fixed	İtema	-32
Type 16	Turkmen	Fixed	Zax	-32,5
Type 17	Urfa	Fixed	Zax	-32
Type 18	Brasil	Fixed	Zax	-32,5

These results examined by variance analyses, and the statistics data showed that the fixing type on the weft yarn were effective on the % shrinkage as main factor (Table 2.). Namely, fixing situation is significant. Besides, weaving loom type were effective on % shrinkage too. However, fibre content in the yarn were not significant statistically.

Table 2. Variance analyses result of the samples

Parameters	F value	P value	Significance level
Model	6,23	0.0045	significant
A-fiber content	1,16	0.3458	**insignificant**
B-weaving loom type	6,14	0.0146	significant
C-fixing situation	16,54	0.0016	significant

As for the 3D model graph of the % shrinkage (Figure 1.), it was seen that the fixing situation was effective on the % shrinkage just as observed in Table 2. the data set of the fabric on the % shrinkage proved that the data set was correct. Besides the data were in the tolerance limit.



4. CONCLUSIONS

As a result, shrinkage test on the weft direction showed that % shrinkage of the fabrics with fixed weft yarn are approximately between -31,7 and -34,5 while % shrinkage of the fabrics with non-fixed weft yarn are approximately between -33,5 and -36,5. Namely, it was seen that fixing situation is effective on the %shrinkage of the fabric. The data from the tests were analysed statistically. According to the variance analyses with the 95% confidence range, it was observed the fibre content was not significant ($p>0,05$) while fixing situation of the yarns and weaving loom type were significant ($p<0,05$). Consequently, it could be reached optimum values of the dimensional stability of the woven fabric by considering parameters on the weaving looms and fixing situation of the weft yarn.