Consequence of Bend and Weft Variables on Fabric's Shrinkage Ratio

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Abstract

This investigation deals with the fabric's shrinkage ratio in both directions that is warp and weft), by grinding the effect ofeach of the warp and weft variables on the shrinkage ratio. These variables are the type, thickness, Yarntension andthe count of both warp and weft yarns in calculation to the weave structure. Afterwards test dissimilar types of these variables and establish that weft density relationship and weft count with shrinkage ratio toward warp is a positive relationship, while the connection shows the amount of weave float and Yarn tension of both warp and weft strand with shrinkage ratio towards warp is an inverse relationship. The warp thickness and warp count with shrinkage ratio towards weft relationship is a positive relationship, while the connection shows the amount of weave float and Yarn tension of both warp and weft thread with the shrinkage ratio towards weft is aninverse relationship. Finally, there is no consequence to the type of weave as if it was a satin or twill on the quantity offabric shrinkage in both directions. Using the SPSS statistical software solutions have been modeling the previous results and get the formula to calculate the fabric shrinkage ratio that takes into account all preceding variables.

Keywords-*Fabric's shrinkage ratio; Fabric's actual length; Warp andweft variables.*

I. INTRODUCTION

Warp thread is showing during the course of the foundation of fabricfor a number of tensile forces consequential from (the position of a backrestroll, open the shed, move the comb to insert a weft), as the weft yarn isvisible to the tensile forces due to (pull of the weft regulator inorder to store it, pull of the rapier for publication within the shed).Investigator Watsonfound that fabric shrinkage ratio affected bythe following variables:

1. The type, count and density of the warp yarns.
2. The type, count and density of the weft yarns.
3. Weave structure

But the warp and weft strain fixed at a certain value, but theresearcher Nisbet found that the effect of warp and weft tension isopposed effect on shrinkage ratio.The researcher Moghe analyzes the percentage of fabricshrinkage near the warp only when spending wefts yarn of polyesterand weft density of 28 to 44 (pick/inch) and so for plain weave 1/1, andestablish that when weft density increases the shrinkage ratio increases.The researcher Edita considered the affiliation between weftdensity and shrinkage ratio for weft concentrations between 21 and 27 pick/cm, but passed the low densities, and concluded that the weft densityconnection with the shrinkage ratio is a direct correlation.The researchers Çeven and Özdemir have deliberate theshrinkage ratio towards the weft thread, used Chenille yarn followingcount (4, 4.5, 5, 5.5, 6) Nm on plain weave 1/1 and warp density of 10to 30 thread/cm. The outcome of their research that a positive associationbetween the warp density and the percentage of shrinkage towards theweft. The relationship among the weft count and the shrinkage ratio isopposite relationship, where the yarn count is metric.

$$warp\,distance = \frac{\left(\frac{100}{D0}.n1\right).\sqrt{4.(ds)^2-(ds)^2}}{p2.\sqrt{4.(ds)^2-(ds)^2}+d1.(n1-p2)}$$

n1: distance between the center of warp thread and weaving axis

ds: the average diameter of warp and weft.

p2: inverted weft density.

The researchers Rukuižienė and Milašius analyzes thepercentage of shrinkage toward warp through three stages, the firststage is among warp width and comb width, and the second stagebetween comb width and woven point width, and the third stagebetween the fabric width throughout weaving and cloth after weaving stageand free it from the forces of tensile aplied it in loom. But just forplain weave 1/1 and polyester yarn from count 70- 100- 150 den. Theydetermined that the fabric shrinks three phases in calculation to that theincreasing count direct thread increases the shrinkage ratio.

The aim of the research is that includes the consequence of each warp andweft variables on the shrinkage ratio, the one hand, the weft densityvalue range of 4 to 20 pick/cm, the warp density range is from 33 to66 thread/cm, yarn stretchable force ranges between 12 to 20 cN/Tex,weaves float from 2 to 20 and lastly the types of thread for the weftyarn studied more than four types in terms of use, namely, (chenille-polypropylene with continuous filament-thread with uninterruptedfilament and amplifying by air ATY (jet)-cotton yarn turbine spinning)while the warp (mixed with a thread of cotton and viscose-polyester DTY) with diverse magnitude of yarn count depends ontype of yarn.

II. MATERIALS AND METHODS OF SEARCH

The study and experiments were directed on the loom model(GTM) from the construction company (Picanol) Belgian, a loomcapable of producing all type of fabrics, because it contains the Jacquard(a device to open the shed) (Figure 1).Warp thread tension was familiar by a device to measure yarntension, its model (I1901) of production company (Schmidt) German.Contraction rate define as the alteration between lengths of threadbefore weaving and beyond, the experiments are divided into two types:

• **determine the percentage of shrinkage towards the weft yarns:**weft yarn identified before weaving by a device for determinecertain lengths of yarn has model (L232), this device has a wheelsurroundings of one meter, but it is tough to be carried out testson the basis of that length of the thread before weaving 1m becausethe entire fabric width 1.4 m, and as the wheel of the machine isdivided into 6 sections by 6 beams, which means that the distancebetween the crossbars are 16.67 cm we will put signs on the yarns ateach edge of the symptoms of the cupboard to be defining thelength of a string weft before weaving.

• **determine the percentage of shrinkage towards the warp yarns:** warpthread identified before weaving on warp beam before backrest rollorder to regulate the length before being subjected to any kind offriction with the loom parts, was chosen length lab 15 cm dependingon the length laboratory at researcher Anderson, as evident inFigure 2 order to reduce error rate dimension.

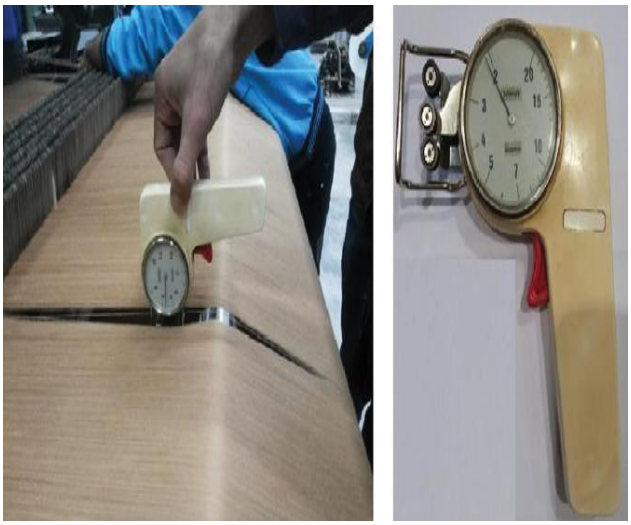

Fig 1: A device for measuring Yarn tension of thread.

Fig 2: Reference Determination of the warp yarn length.

III. RESULTS AND DISCUSSION

Effect of weft density on fabric shrinkage ratio toward warp: Densities tested were (4, 8, 12, 16, 20) thread/cm, since thisrange covers weft densities in all kinds of fabrics, even consisting ofmore than one type of weft yarn such as the curtains and cabinets.In definite of the Figure 3 that increase weft density will increasesfabric shrinkage and reason for this is an increase in density of theweft increases length of the warp thread which restricts with theweft thread path. Comparing this result with results of the researcherEdita M note match outcomes, but the researcher Edita M studied thedensities of high field only and therefore not able to infer the equationlinking weft density and the ratio of shrinkage, while our studyhas larger weft density field.

Effect of weave type on fabric shrinkage ratio toward warp: Due to plain is one of the twill weaves, the appraisal here will bebetween twills and satins, and

will test two expanse of floating for eachof the two weaves (1/7, 1/15).Note match in the measurement of shrinkage towards warpyarns among each of the weave satin and twill for two tested float(1/7 - 1/15), which shows that there is no effect of the type of weavewhether twill or satin on the fabric shrinkage ratio.On the other hand, and for Description of the previous result, wemust study the number of intersections in a pair of weave satin andtwill to one of the previous float (1-7).Can compute the number of intersections happening within aweave by Ned Graphics program and note that number of intersectionsbetween each of the twill and satin is the same in one repeat.

Effect of weave floating on fabric shrinkage ratio toward warp: Amounts of floats were tested casing more weaves traded in thepractical field, namely (2, 4, 8, 12, 16, 20).The figure shown that the association between the proportion ofshrinkage towards warp yarns and the amount of float is inverse.This result did not match with the result of the researcher Milašiusand Vytautas in the relationship among the type of weave and thefabric shrinkage, so the reason for this is that weaves tested by theresearcher is of derivatives plain, this weaves don't consequence on floatamount, while the method of studying the effect of the amount of floaton the decrease ratio is comprehensive.

Effect of weft's yarn tension on fabric shrinkage toward warp: Range of weft's tension tested are (20, 18, 16, 14, 12) cN/Tex.Positive from the contrary relationship betweenpercentage of shrinkage towards warp and weft's tension. Though,the effect of weft's tension on the fabric shrinkage toward the warp isa slight effect, where the alteration between the highest percentage ofshrinkage and the lowest is up 1%, and the reason that the improvedweft's tension will press the warp thread just in weave point, on theother hand weft's tension does not effect on the amount of used warpthread.

Effect of warp density on fabric shrinkage toward weft: Warp densities are selected (66, 45, 33) end/cm, because the warpdensity interrelated to harness density, because of the tested fabrics areupholstery fabrics and curtains, harness density are (66, 45, 33) end/cm.Certain from the Figure 11 that when warp density increases fabricshrinkage toward weft increases, the reason for this result is when thenumber of warp yarns per length unit increases the number of weftconnections increases, thus the shrinkage ratio towards weft increases.

Effect of weave floating on fabric shrinkage ratio toward weft: Amount of weave float has been selected are (2, 4, 8, 12, 16 and 20).Comparison shows that the inverse relationship between thepercentage of shrinkage towards weft and the amount of float, as thenumber of connections increases the required weft length increases,thus the shrinkage ratio increases.

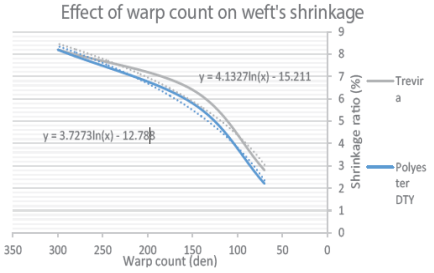

Fig 3. Relationship between warp count with fabric shrinkage toward weft yarns for Trivera warp yarn.

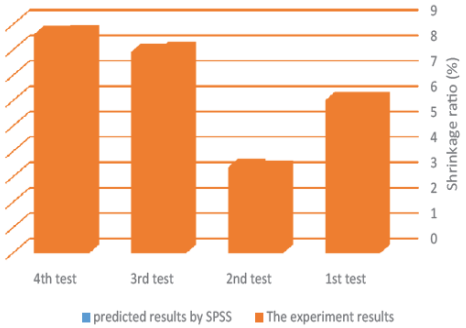

Fig 4 :Relationship between warp count with fabric shrinkage toward weft yarns for Polyester DTY warp yarn.

IV. RESULTS

- Variables that consequences on fabric shrinkage ratio towards warp are:weft density, weft count, weft type, weft's Yarn tension, warp's Yarntension and weave float.
- Variables that outcome on fabric shrinkage ratio towards weft are: warpdensity, warp count, warp type, weft's Yarn tension and warp's Yarntension and weave float.
- Connection between weft densities with fabric shrinkage ratiotoward warp is a positive correlation. It matches with the result ofthe researcher Edita M.
- Relationship between weft count with fabric shrinkage ratio towardwarp is a positive correlation.
- Association between weave float with fabric shrinkage ratio towardwarp is an inverse correlation. This result does not matches with theresult of the researcher Milašius and Vytautas.
- Relationship of each warp and weft Yarn tension with fabricshrinkage ratio toward warp is an inverse correlation.

- Affiliation between warp densities with fabric shrinkage ratiotoward weft is a positive relationship.Relationship between warp counts with fabric shrinkage ratio towardweft is a positive relationship. This result does not matches with theresult of the researcher Rukuižienė and Milašius.
- Association of each warp and weft Yarn tension with fabricshrinkage ratio toward weft is an inverse correlation.
- There isn't effect of weave type whether Satin or Twill on fabricshrinkage ratio toward both warp and weft direction.

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