ENHANCING THE COMFORT PROPERTIES OF KHADI BLENDED BY USING SELECTED FINISHES

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Abstract:

In the recent years the new developments in specialty finishes sector are driven by consumers changing lifestyles, towards a more casual clothing look, with a greater preference for higher standard of aesthetics, comfort, health and safety, protection and easy care performance. Some of the specialty finishes are high value – added chemical finishes that will exert a premium in the market and relive the pressure on the bottom line.

Most of the low and medium handloom fabrics are having some poor properties inherent to them, e.g., poor dyeing quality, poor light and washing fastness, unevenness of clothes due to severe yarn count variation and so on. The fabric made from Khadhi spinning system exhibits rough surface and low comfort properties. The Kahdhi yarn has more variation and low strength which results in poor appearance of fabric. In this research work an attempt is made to improve the properties of Khadhi woven fabric by giving suitable finishes using softener. The cow dung and silicone were used as softening materials. The softening materials are applied on the fabric using pad-dry-cure method. To assess the effect of softening on the fabric various subjective tests and objective evaluation has been carried out.

Key words: Khadi yarn, Count variation, Softener, Pad-dry-cure.

1.INTRODUCTION

Khadi is also known by another name Khaddar. Khadi is mainly woven in pure cotton, but it can also be woven in silk and wool or in a mix of fibres. The making of khadi is eco-friendly since it does not rely on electric units and the manufacturing processes do not generate any toxic waste products.It has a handcrafted self-texture making each khadi cloth unique and expensive. Its inherent strength makes it highly durable. Khadi is a versatile fabric. It has the unique property of keeping the wearer warm in winter as well as cool in summer season. This fabric has coarse texture and gets easily crumpled, therefore in order to keep it firm and stiff, starch is to be added. Khadi has gained worldwide appreciation as it is hand made, durable, long lasting and organic in nature. The fabric is produced by the masses for the masses. It is associated with Gandhian philosophy as well as makes a fashion statement. Through the medium of khadi weaving, the weaver expresses art and designing by the spindle and loom. It is widely accepted in the Indian fashion circle. Leading fashion designers now include it in their collection by designing clothes with khadi material. There is huge demand of it in international market, especially in western countries. There is also khadicloth made of mixture of natural and manmadefibers called poly khadi

2. LITERATURE REVIEW.

Clothing comfort is an extremely complexphenomenon and has drawn the attention ofmany textile research workers. It can be classified into three groups, namely psychological,tactile and thermal comfort. Thermal comfort isthe factor governed by the movement of heat,moisture and air through the fabric.The thermalproperties of cotton and polyester based singlejersey of 1×1 rib and interlock structure werestatistically investigated by Oglakcioglu andMarmarali (2007). The result indicated that eachknitted structure tends to yield rather differentthermal comfort properties. Su et al. (2007) studied moisture absorptionand release of polyester and cotton compositeknitted fabrics. Experimental results revealed thatthe diffusion rate and drying rate become betterwith decreasing cotton content.Durability of fabric is one of the very important criteria for consumers. Durability is affected mainly by strength, abrasion resistance andother related mechanical parameters. Sawhneyet al. (1991) did the comparison of fabrics madewith cotton covered polyester staple-core yarnand 100% cotton yarn. Sa Whney A P S, et al (1991) found in their study that, application of DMDHEU finish on the staple-

core-yarn fabrics improves the DP rating and does not degrade the mechanical properties of fabric to the extent usually observed in similar treated 100% cotton fabric. The DP ratings of 3.0 for the plain weave fabric and twill weave fabric yield a satisfactory DP rating of 4.0 without the resin.

3. MATERIAL AND METHODS

67/33 polyester/cotton blended khadi fabric was selected for the study. Cow dung and silicone were used as finishing agent and treated for special finish. The fabric was desized to remove the natural impurities using 12 grams of detergent solution at 100oC for 45 minutes. The special finish was given to the fabric by Exhaust method for cow dung and pad – dry cure method for silicone softener.

The cow dung were mixed with water in stainless steel vessel and different concentration of solutions ranging from 10gm, 20gm, 30gm, 40gm, 50gm, 75gm and 100gm/100ml, finishing time was done at 6, 12 and 24 hours by keeping the cow dung concentration at constant level with temperature of 36oC, 45oC and 60oC. Similarly, SIBASOF 400 silicone solutions were taken and the samples were dipped in tray for five minutes, padding these samples were dried and cured for five minutes. Drying at 160 o C for 45 seconds under a pressure of 2.3 kg/cm2

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Table 1. Sample code details

S.No	Sample	Sample code name
1.	Unfinished	UF
2.	Cow Dung finished	CF
3.	Silicone finished	SF

4. RESULTS AND DISCUSSION

4.1 VISUAL INSPECTION

The results of visual examination of unfinished and finished samples are given in Table-

Table 2 Visual inspection results

S. No	Samples	General Appearance %			Brightness %			Softness %			Luster %		
		G	F	P	B	M	D	S	M	C	H	M	D
1	UF	42	51	7	-	48	52	-	28	72	6	68	24
2	CF	62	22	16	56	24	16	92	8	-	48	24	28
3	SF	64	30	6	48	28	24	96	4	-	12	40	48

G-Good; F-Fair; P-Poor; B-Bright; M-Medium; D-Dull; S-Soft; C-Course; H-High

From the above table2 the General appearance, Brightness, Softness and the luster of unfinished samples are rated as 42%, 48%, 28% and 6% respectively by judges. The results concluded that the cow dung treated samples and silicone treated samples were good for general appearance. It was rated as 62 %(cow dung) and 64% (silicone) respectively. The brightness of cow dung and silicone treated samples were increased when compared with unfinished sample as 56% and 48% respectively. The softness of the cow dung and silicone treated samples are also increased to 92% (cow dung) and 96% (silicone) respectively. As far as luster is considered, the rating is 48% and 12% for cow dung treated and silicone treated samples. Hence it could be concluded that after giving special finish to the untreated sample the General appearance, Brightness, Softness and the Luster had increased well in the above parameters.

4.2 TENSILE STRENGTH AND ELONGATION OF FABRIC

Table*3. Strength and elongation of fabric*

S.no	Samples	Warp way Mean strength(Kg)	Warp way Mean Elongation (cm)	Weft way Mean strength (Kg)	Weft way Mean Elongation (cm)
1	UF	22.8	0.8	23.2	0.80
2	CF	35.2	1.2	22.6	0.82
3	SF	23.6	1.1	15.8	0.82

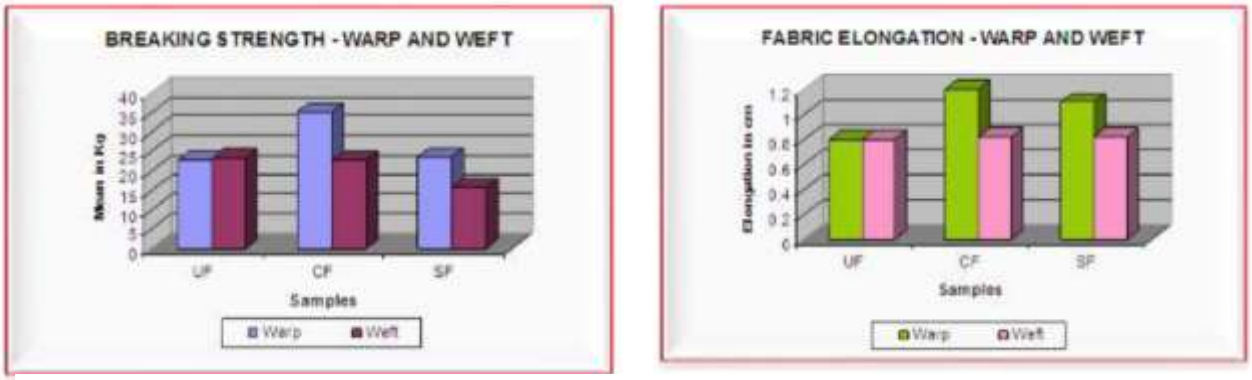

Figure 1. Tensile strength and elongation of fabric

From the above table3 it is clear that there is an increase in fabric strength in warp way in finished samples when compared to unfinished sample. The percentage gains in fabric strengthin warp way of fabric finished using cow dung sample over unfinished fabric is 54.4% and for silicone finished sample is 3.5%. The fabric strength in weft way of finished samples was decreased when compared to unfinished sample. The percentage loss of fabric strength finishedwith cow dung as coating element over unfinished fabric strength in weft way direction is 2.6% and for silicone finished sample is 31.8%.it is seen that the Analysis of Variance done for breaking strength – warp way and weft way proved that difference between unfinished and finished sample is significant at 1% level.

In case of fabric elongation there is a 50% (cow dung finish) and 37.5 % (silicone finish) increase in warp way when compared to the elongation of unfinished sample. It has been observed that there is only 2.5% increase in elongation of fabric in weft way of fabric due to finishing. .

4.3 FABRIC STIFFNESS, DRAPE AND ABRASION RESISTANCE

Table 4. bending and abrasion resistance of fabric

S.no	Samples	Stiffness (warp way) (Cm)	Stiffness (weft way) (Cm)	Fabric Drape coefficient	Fabric Abrasion resistance (%)
1	UF	1.5	1.7	0.82	4.6
2	CF	1.4	1.4	0.83	2.2
3	SF	1.3	1.2	0.85	2.2

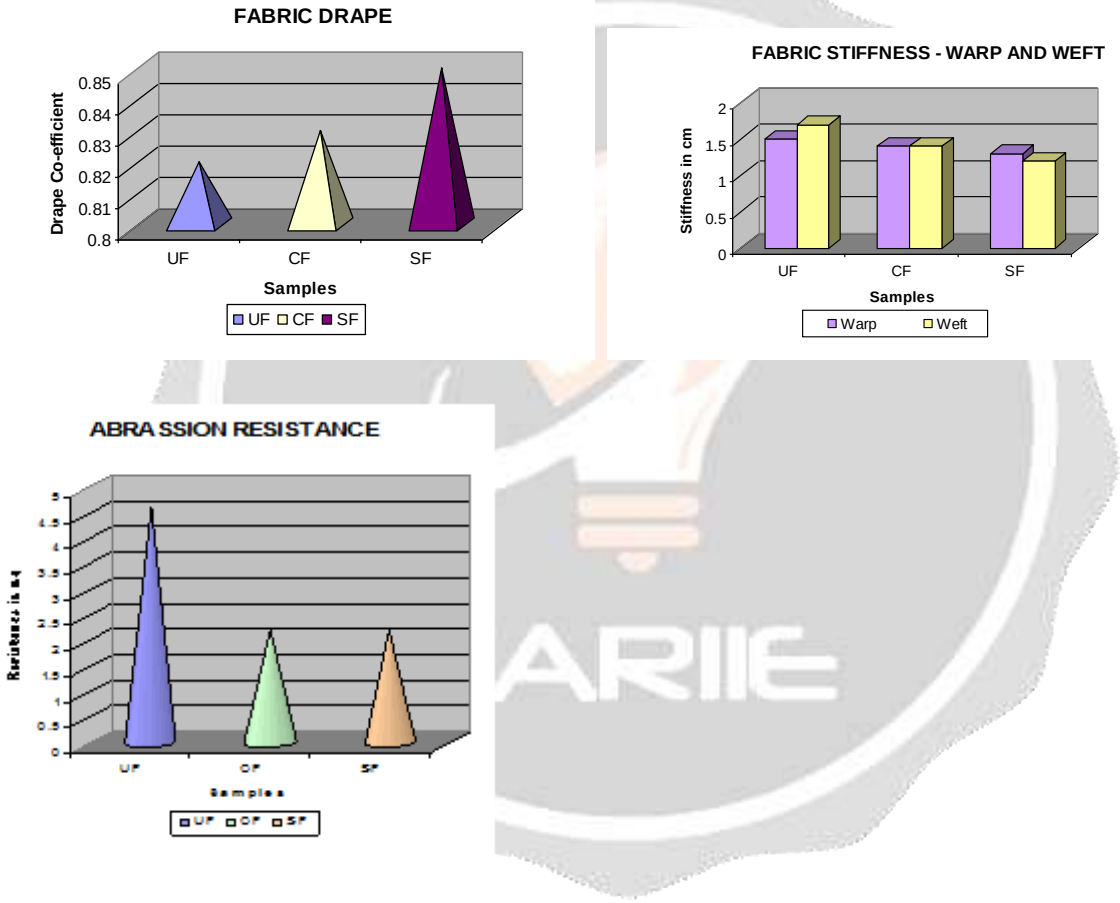

Figure 2. Stiffness, Drape and Abrasion resistance

The stiffness of the fabric(table 4) is reduced to 17 to 20% due to the finishing given to the fabric. This also can be justified by the increase drape coefficient of the finished fabric compared with unfinished sample. Similarly the abrasion resistance of the fabric is quite getting reduced due to finishing process.

5. CONCLUSION

The silicone treated fabric was rated to be good in general appearance and softness by above 90% of the judges whereas cow dung was rated to be good in bright ness and luster by above 50 % of judges.The increase in the Breaking strength - warp of softener treated sample is due to greater percent warp elongation observed. This percentage increase was more with respect to cow dung treated sample i.e. 54.4% and for silicone treated sample is 3.5%.The percentage decrease tensile strength - weft in of cow dung treated sample over unfinished is 2.6% and for silicone is 31.8%.• The percent Fabric

Elongation increased on treatment with softeners which may be due to formation of thin film of softeners on the fabric surface which lowers the inter molecular attraction within the fibers which in turn strengthens the fiber. The gain percentages observed in fabric elongation in the warp and weft direction are 50% and 2.5% for cow dung and 37.5% and 2.55 for silicone respectively. Reduction in Fabric stiffness was observed on treatment with softeners in both warp and weft directions, which may be due to the effect of softeners that has imparted softness and smoothness to the finished fabric, thus making the fabric more pliable. Fabric stiffness in the warp and weft direction is decreased by 6.7% and 17.6% for cow dung treated sample and for silicone treated sample is 29.4% and 13.7% respectively.Loss in Abrasion Resistance of softener treated sample is due to removal of size present on the fabric surface, thus imparting soft and pliable structure to the fabric by internal softening also. Though softener treated samples showed less resistance to abrasion but percent loss in mass was negligible. Thus softener finish can be safely used on the blended polyester/cotton khadi fabric. The percentage decreased of cow dung and silicone treated sample for abrasion resistance is 52.2% respectively.Improvement in Drape quality was noticed in softener treated samples. This may be because of softener treatment that imparted excellent softness to the fabric sample, which is evident from reduction in the bending path and lower crease recovery angle, which in turn positively support the improvement in the drape ability. The Drape co-efficient increased after special finish by 12.19% for cow dung and 36.58% for silicone respectively.

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