The Effect of Using Chenille Yarns Produced from polyester Microfiber on Upholstery Fabrics Properties

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Abstract:

The research aims to study the effect of using chenille yarns produced from polyester microfiber on the properties of upholstery fabrics through a comparative study between samples of chenille fabric produced by different pile material of chenille yarns (traditional polyester (48 fiber) Polyester microfiber chenille (288,576 fiber), different weave structures were used with difference of float weft length(1.5-2.1-2.6mm). Tests were done to the produced samples (tensile strength and elongation test of textile fabrics, abrasion resistance test; and stiffness of fabrics test). It was found in the statistical analysis of the tests' results that chenille polyester microfiber (576 fibre) weave structure with a float length (1.5 mm) achieved the highest tensile strength and elongation, chenille polyester microfiber (288 fibre) weave structure with a float length (2.6 mm) achieved the highest abrasion resistance, and lastly traditional polyester (48 fiber) weave structure with a float length (1.5mm) has a higher stiffness.

Key words: Fancy yarns- Chenille- Polyester- Microfiber

Research Problem

The difficulty of predicting the natural and mechanical properties of chenille upholstery fabrics manufactured from microfiber.

Research Aim

Comparative study between chenille upholstery fabrics manufactured from polyester fiber and chenille upholstery fabrics manufactured from polyester microfiber by the different number of fibers in the cross section of yarn

Research Importance

Presenting a scientific study on the use of microfibers in chenille upholstery fabrics.

Methodology

Analytical experimental methodology

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Experimental Work

Table (1) Specification of the machine used for producing samples

No	Property	Specification
2	Shedding system	jackred
4	Machine width	172 cm
5	Number of healds	3072 helds
6	Reed used(dents/ cm)	9 dents /cm
7	Denting	8 ends per dent

Table (2) Yarn Count and Yarns Set Used in Producing Samples

Yarn count	Warp	150 den
	weft	Cotton 16/1
		Chenille 4.5 m.c
Yarn set	Warp	72 End/cm
	weft	24 pick/cm

Research Variables

Samples of chenille fabric produced by different pile material of chenille yarns (Traditional Polyester (48 fiber)-Polyester microfiber chenille (288 fiber)-Polyester microfiber chenille (576 fiber) were produced using a double technique and three weave structures were used as follows:

First structure

- **structure of face (twill 1/5)** **-structure of back (plain 1/1)**

Second structure

- **structure of face (twill 1/7)** **-structure of back (plain 1/1)**

Third structure

- **structure of face (twill 1/9)** **-structure of back (plain 1/1)**

The Arrangement of Warp 1f:1B and The Arrangement of Weft 2B:1F

Table (3) The specification of all samples

S.NO.	Yarn type		Structure used
	weft	warp	
1	1-Cotton 2-Conventional polyester chenille (48 fibers)	polyester	First structure a float length (1.5 mm)
2	1-Cotton 2-Conventional polyester chenille (48 fibers)	polyester	Second structure a float length (2.1 mm)
3	1-Cotton 2-Conventional polyester chenille (48 fibers)	polyester	Third structure a float length (2.6 mm)
4	1-Cotton 2- Polyester microfiber chenille (288 fibers)	polyester	First structure a float length (1.5 mm)

5	1-Cotton 2- Polyester microfiber chenille (288 fibers)	polyester	Second structure a float length (2.1 mm)
6	1-Cotton 2- Polyester microfiber chenille (288 fibers)	polyester	Third structure a float length (2.6 mm)
7	1-Cotton 2- Polyester microfiber chenille (576 fibers)	polyester	First structure a float length (1.5 mm)
8	1-Cotton 2- Polyester microfiber chenille (576 fibers)	polyester	Second structure a float length (2.1 mm)
9	1-Cotton 2- Polyester microfiber chenille (576 fibers)	polyester	Third structure a float length (2.6 mm)

Table (4) Laboratory tests carried out and standard methods

test	Machine type	standard method
Tensile strength and elongation	Asano Machine	ASTM D 5035
Abrasion resistance	Universal Wear Tester (TOYOSEIKI)	ASTM D 3885
Stiffness	JIKA(TOYOSEIKI)	ASTM D 1388

Table (5) Results of all tests applied to samples

Material	weave Structure	Float length	S. No.	Tensile strength Kg/cm	Elongation %	Percentage of weight loss due to friction %	Stiffness
Chenille polyester (48 fiber)	First structure	1.5 mm	1	202	40	12.2	6943
	second structure	2.1 mm	2	198	36	8	6854
	third structure	2.6 mm	3	191	34	6.8	6790
Chenille polyester microfiber (288 fibers)	First structure	1.5 mm	4	208	43	3.5	5636
	second structure	2.1 mm	5	205	38	2.4	5584
	third structure	2.6 mm	6	196	37	1.4	5289
Chenille polyester microfiber (576 fibers)	First structure	1.5 mm	7	212	44	5.6	5354
	second structure	2.1 mm	8	209	41	3.5	5205
	third structure	2.6 mm	9	208	38	3	‘ Q

Results and Discussions

1- Effect of Research Variables on Tensile Strength (kg / cm)

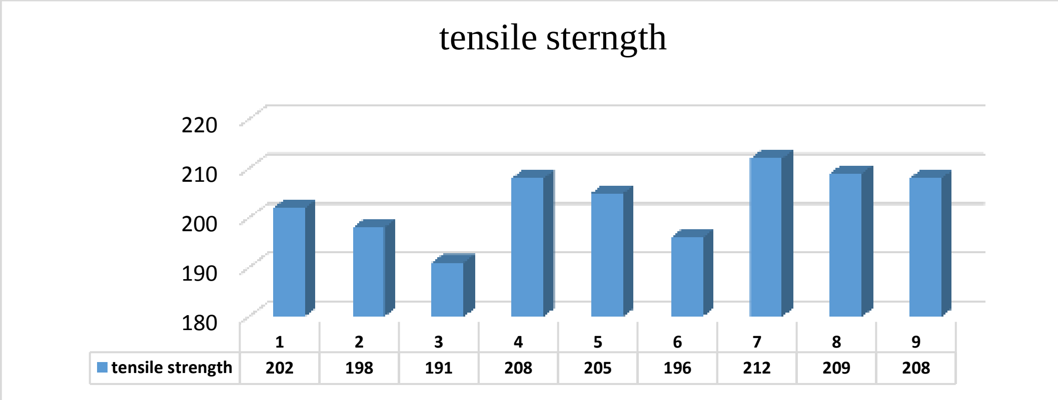


Fig (1) Effect of research variables on tensile strength (kg / cm)

- From table (5) and fig (1) the sample (7) chenille polyester microfiber (576 fibre) weave structure with a float length (1.5 mm) achieved the highest tensile strength; this means that when the number of filaments in the yarn cross section increases, tensile strength will be increased (direct relationship). This is because of increasing the proximity of filaments next to each other therefore they become more integrated and twist around the axis of the thread so they become harder to slip
- Furthermore, when the float length increases, the tensile strength will be decreases (inverse relationship) , this is due to the fact that by increasing the length of the float, the threads will be less integrated with each other, which make it easier to slide and move. Sometimes the high integration may impede the movement of the threads, which reduces the tensile strength, but this was not achieved in the structures used in the production of the research samples, where the structure of plain 1/1 used in the back only, but in the face twill 1/5, 1/7, 1/9 was used.

Effect of the Research Variables on the Elongation Properties in weft direction (%)

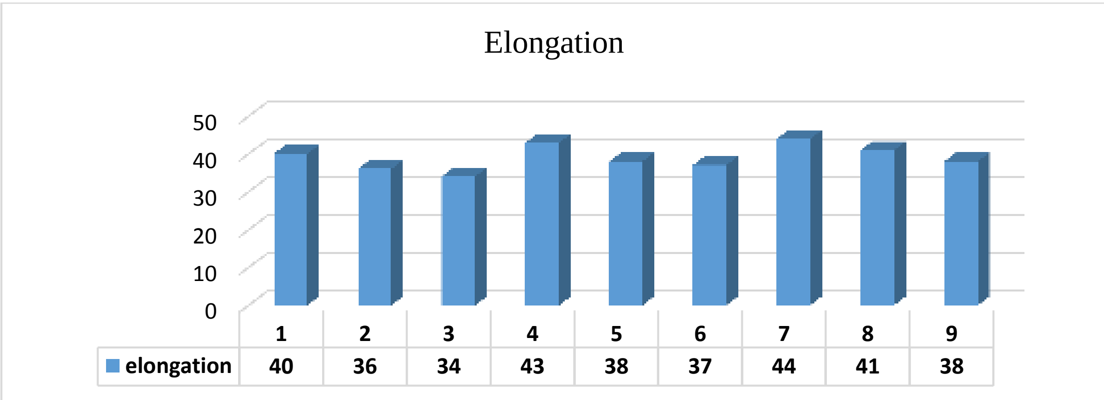
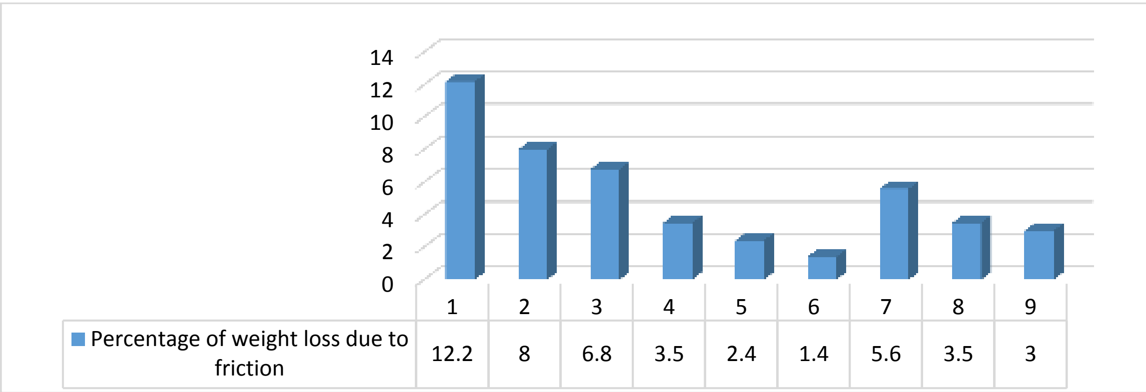


Fig (2) Effect of the research variables on the Elongation Properties in weft direction

- From table (5) and fig (2) the sample (7) chenille polyester microfiber (576 fibre) weave structure with a float length (1.5 mm) achieved the highest elongation, this means that when the number of filaments in the yarn cross section increases the elongation will be increased(direct relationship) this can be attributed to increasing the number of filaments in the cross section, the contact points between the filaments are increased, leading to an increase in elongation in the thread before the cut occur, which leads to elongation of the fabric produced.

- Furthermore, when the float length increases, the elongation will be decreased (inverse relationship) this is due to the fact that by increasing the length of the float, the crimp ratio in the thread will be reduced, which will reduce the elongation ratio of the thread in the produced fabric

<u>Effect of Research Variables on the Friction Property Until Cutting in weft direction</u>



Fig(3) Effect of research variables on the friction property until cutting in weft direction

- From Table (5) and Fig (3) the Sample (6) chenille polyester microfiber (288 fibre) weave structure with a float length (2.6 mm) achieved the highest abrasion resistance. This Mean That the number of Filaments in the Yarn Cross Section increases, the percentage of weight loss will be decreased (inverse relationship). This can be attributed to the movement of fibres and higher frictional forces between fibres in the yarn cross section. As a result, the fibres cannot remove easily from the fabric structure. However, if the number of fibres exceeds a certain limit, the weight loss is increased again, as in the chenille polyester microfiber (576); this is due to the greater congestion of fibres, thus losing the space needed to resist friction.
- Furthermore, when the float length increases the percentage of weight loss decreased (inverse relationship) this is due to the fact that by increasing the length of the float, the threads are less integrated with each other, which give more space for free movement of the threads needed to resist friction.

<u>The Effect of the Research Variables on the Stiffness Property in weft direction (mg)</u>

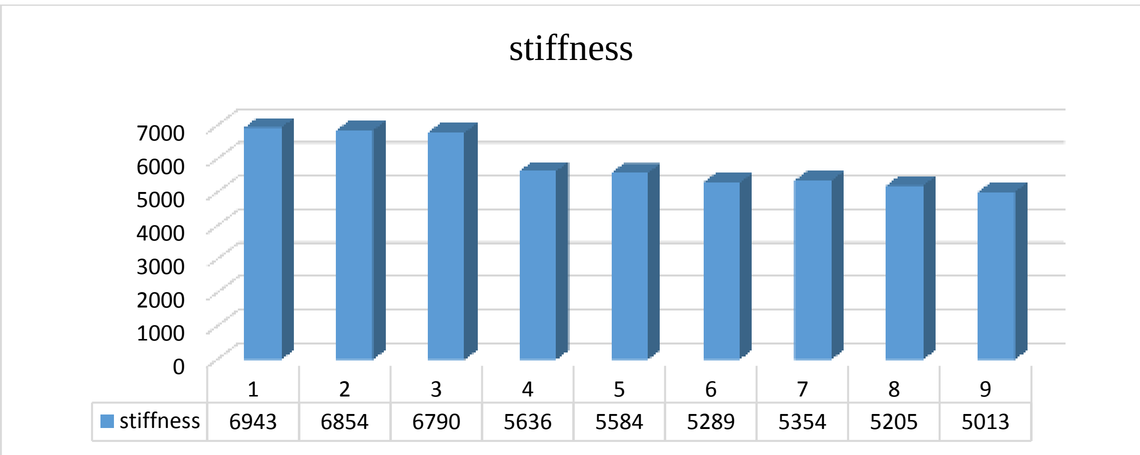


Fig (4) The effect of the research variables on the stiffness property in weft direction

- From table (5) and fig (4) the sample (1) chenille polyester (48 fiber) weave structure with a float length (1.5mm) have a higher stiffness, while the sample (9) chenille polyester microfiber (576 fibre) weave structure with a float length (2.6 mm) achieved less stiffness; this means that when the number of filaments in the yarn cross section increases, the stiffness will be decreased (inverse relationship). This can be attributed to increasing the number of filaments in the cross section which resulted from increasing the fineness of fibers, which in turn increases the Flexibility and softness of the threads
- Furthermore, when the float length increases the stiffness will be decreased (increase smoothness- inverse relationship) , This is due to the fact that by increasing the length of the float, the threads will be less integrated with each other which will facilitates the movement of yarns and reduces the rate of stiffness and increase the smoothness of produced fabrics.

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