INVESTIGATION ON THE USAGE OF THE WAXED YARNS FOR PREVENTING DUST PROBLEM DURING THE WEAVING PROCESSES OF THE COTTON/POLYESTER BLENDED FABRIC

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EXTENDED ABSTRACT
In the textile industry, it has been seen the dust during the weaving preparation processes and weaving processes of the Cotton/Polyester blended yarns due to the polyester fibres. The dust especially occurs during the weaving processes because of the leaving of the non-participating fibres in the yarn structures from the yarn surface by helping friction. The dust, in the course of pulling the warp yarn, causes the end-down and fly. On the other hand, the dust, in the course of weaving, causes fly, thread breakage and warp streak. In the study, it was utilized the waxes, which have been using for coating and gaining lubricity to the yarns in the knitting processes, for reducing dust during weaving preparation and weaving processes. A various type weaved fabric was obtained by changing weft yarn type and count, weft and warp yarn paraffin situation. During the production of the fabric dust measurement was taken. Then the results were analysed statistically. Consequently, it was seen that the wax usage and wax type are effective on the minimizing dust forming in the course of woven fabric production.

Key Words: Weaving loom, woven fabric, dust, wax,

1. INTRODUCTION
The productivity and making production keeping to labour right is very important subject for textile industry. The dust is a dangerous risk opposite to these priority. To achieve the reducing of dust problem especially in the weaving loom will be very important output for a textile mill. In Matesa Textile Weaving Mill, the dust is a problem and the reason of the dust is not known exactly. In this research, firstly, the reason of dust emission tried to be revealed for cotton-polyester yarn. Then, with usage of wax, this problem was tried to be reduced.

2. MATERIAL AND METHOD
2.1 Material
In the study, eight-teen different types 3/1 S twill (CO/PES blended) weaved fabrics were used. In the course of the production of these weaved fabrics, three weft yarns, three different weft yarn paraffin situations and two different warp yarn wax situations were accepted as parameters. Weft yarn (Ne 10/1 open- end) were the same all weaved fabrics. Information about weft and warp yarn were given in Table 1.

Table 1. Weft and warp yarn codes, properties and their fixing situation

Type A	1	Non-waxed	Ne 20/1 Open- end
	2	Waxed-1	
	3	Waxed-2	
Type B	1	Non-waxed	Ne 20/1 Ring
	2	Waxed-1	
	3	Waxed-2	
Type C	1	Non-waxed	Ne 16/1 Open- end
	2	Waxed-1	
	3	Waxed-2	
Type D	1	Non-waxed	Ne 10/1 Open- end
	2	Waxed-1	

2.2 Method

The weaving process were done via the air jet weaving loom and the working conditions were adjusted as working speed 600 rpm, 65% humidity, working temperature 28℃.

2.3 Tests and Analyses

During the waving process, dust measurements were taken. According to the analysis of variance with the 95% confidence range, the data from these measurements were statistically analysed, and the effects of the waxes using in the weft and warp yarn on the dust were investigated.

3. RESULTS AND DISCUSSIONS

The dust measurement values were given in Table 2. On examining these results, it was seen that the wax usage was effective on reducing the forming dust, fly when the wax was used on the warp and weft yarn at the same time. Dust measurement from the warp clearly indicated that dust forming reduced more than 10% for both dust particle sizes.

Table 2. The dust measurement results.

Sample code	Weft yarn	Warp yarn	Dust from warp		Dust from weft	
			2,5 µg/m³	1,0 µg/m³	2,5 µg/m³	1,0 µg/m³
Type1	A1	D1	66	124,5	527	1675
Type 2	A2	D1	65	124,5	471	1440
Type 3	A3	D1	64	122	431	730
Type 4	B1	D1	67	124,5	444	1641
Type 5	B2	D1	68	124	301	1461
Type 6	B3	D1	67	127	272	1202
Type 7	C1	D1	68	122	478,5	1573
Type 8	C2	D1	67	124	342	1202
Type 9	C3	D1	68	124	302	1007
Type 10	A1	D2	51	104	529,5	1673
Type 11	A2	D2	52	104	472	1444
Type 12	A3	D2	52	104	432	1326
Type 13	B1	D2	51	104	441	1649
Type 14	B2	D2	51	104	302	1461
Type 15	B3	D2	52	104	273	1204
Type 16	C1	D2	51	104	473	1574
Type 17	C2	D2	52	104	344	1204
Type 18	C3	D2	52	104	305	1112

Table 3. showed that the usage of the waxes on the warp yarns are significant ($p<0,05$), the waxes on the weft yarn was insignificant ($p>0,05$) for both the dust during the weaving and stopping of the weaving loom.

Table 3. Variance analyses on the 2.5 µm dust particles of the warp yarn

Parameters	F value	P value	Significance Level
Model	284,65	< 0.0001	Significant
A-Weft yarn	5,53	0.0241	Significant
B-Weft yarn wax type	0,11	0.9001	**Insignificant**
C-warp yarn wax type	1967,66	< 0.0001	Significant
AC	6,81	0.0136	Significant

In the line with the variance analyses, the model graph verified that wax usage on the warp yarn is effective enough. (Figure 1.) Besides, normal distribution graph verified that the data set was correct.

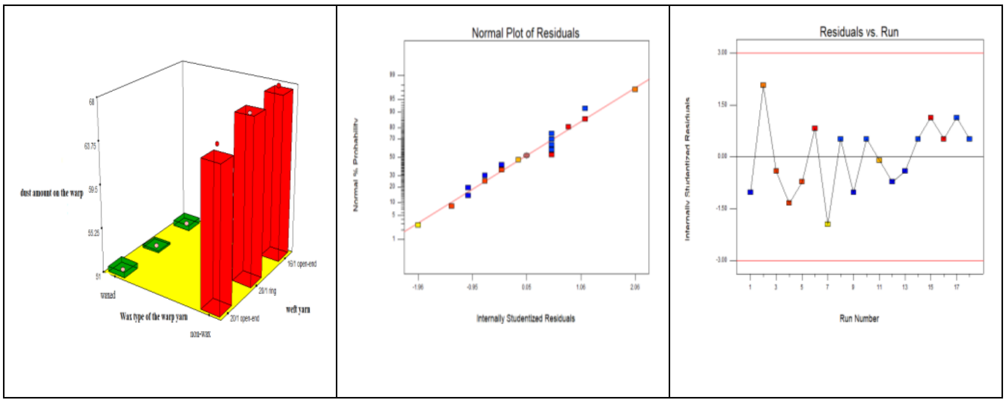

Figure 1. Fly, normal distribution and residual value graphs of the 2.5 μm dust particles of the warp yarn

Table 4. showed that the usage of the waxes on the warp yarns are significant (p<0,05) while the waxes on the weft yarn and the weft yarn type were insignificant (p>0,05) for both the dust during the weaving and stopping of the weaving loom.

Table 4. Variance analyses on the 1,0 μm dust particles of the warp yarn

Parameters	**F value**	**P value**	**Significance Level**
Model	165,61	< 0.0001	Significant
A-weft yarn	1,43	0.3104	**Insignificant**
B-weft yarn wax type	0,18	0.8392	**Insignificant**
C-warp yarn wax type	1810,01	< 0.0001	Significant

In the parallel with the variance analyses, the model graph verified that wax usage on the warp yarn is effective on reducing the number of dust particles (Figure 2.). Moreover, normal distribution graph verified that the data set was correct.

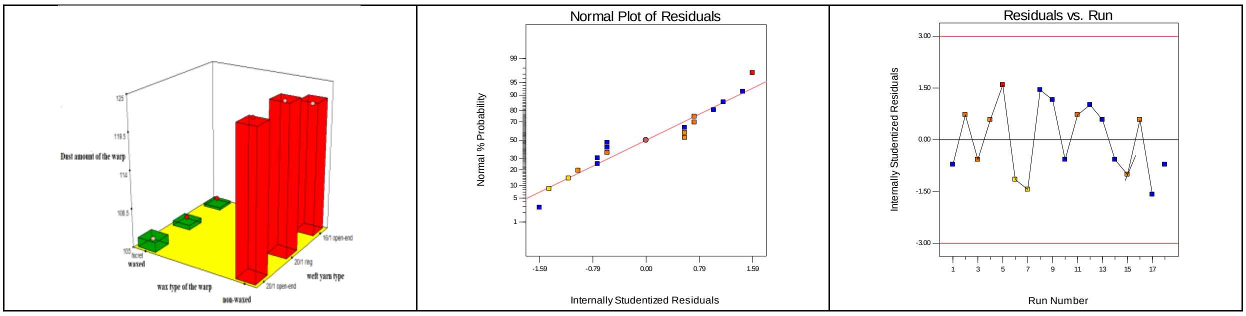

Figure 2. Fly, normal distribution and residual value graphs of the 2.5 μm dust particles of the warp yarn

4. CONCLUSION

As a result, it was revealed that it could be prevented dust during the weaving in associated with wax types and presence of the wax. With this way, the number of stopping the weaving loom could be reduced, and productivity loss could be minimized. In additional, it was thought that illnesses based on dust emission in textile industry might be reduced.