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Journal of the TEXTILE Association

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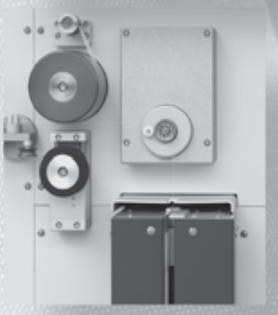

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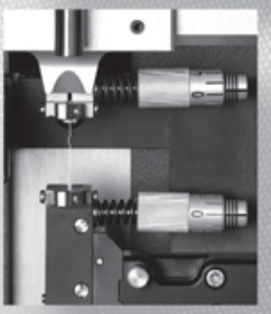

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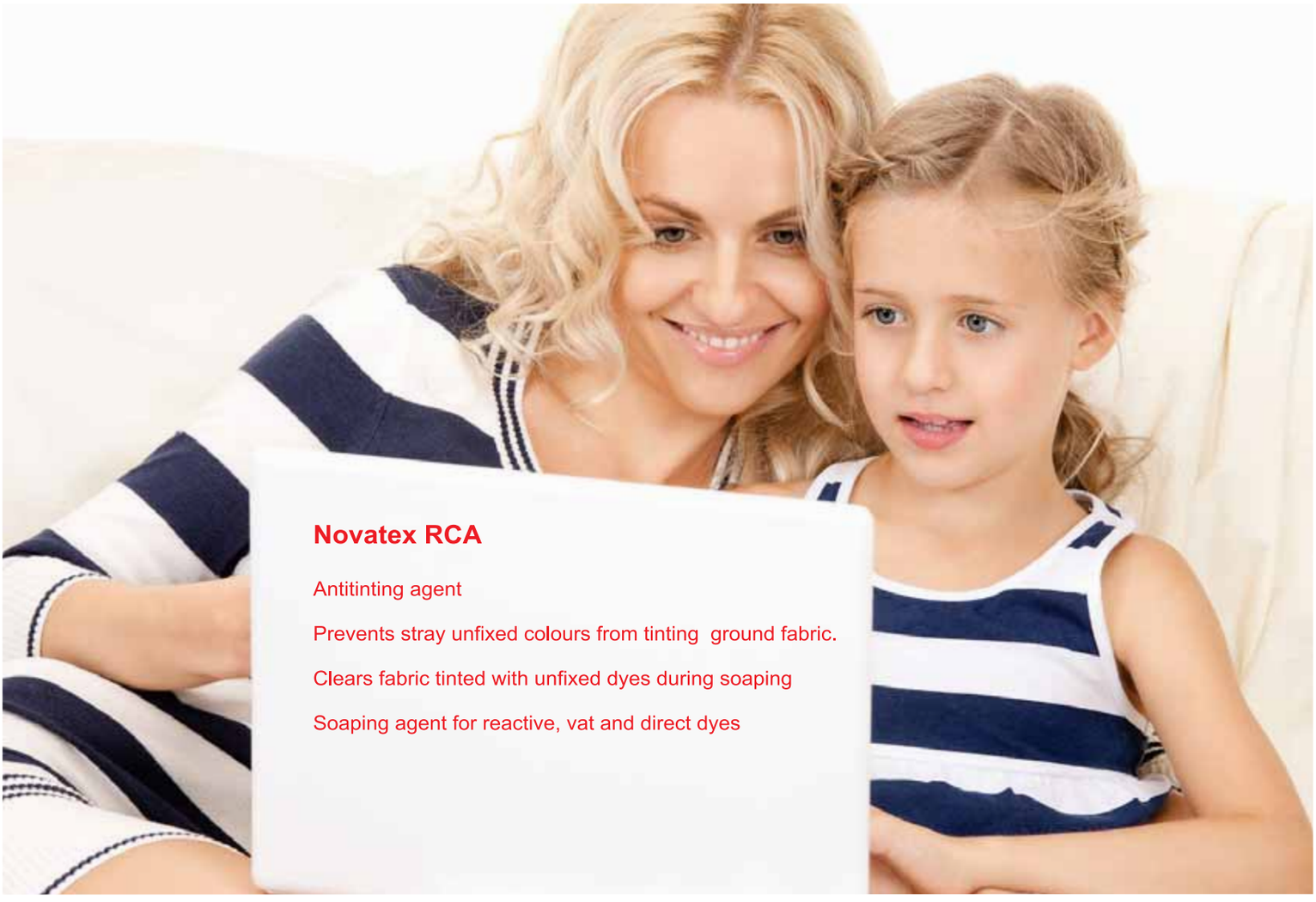

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- ❑ Textile Business in Asian Countries
- ❑ Business opportunities n Burma and Africa - Emerging new low cost production centres
- ❑ Financials – Banks & institutional support for textile projects
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- ❑ Supply chain management & logistics
- ❑ Consumer expectations & rising demands
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- ❑ Innovations in chemicals & dyes to beat the challenges
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- ❑ Development potential in non apparel sector

For more information please contact:

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Visitor Profile

- Buyers, Users, Traders, Importers, Exporters of Products in Textiles and Apparel
- Existing Industry Players
- Fashion Designers
- Builders, Interior Designers
- Hotels, Hospitals & Institutional Buyers
- Scientists, Consultants, Students
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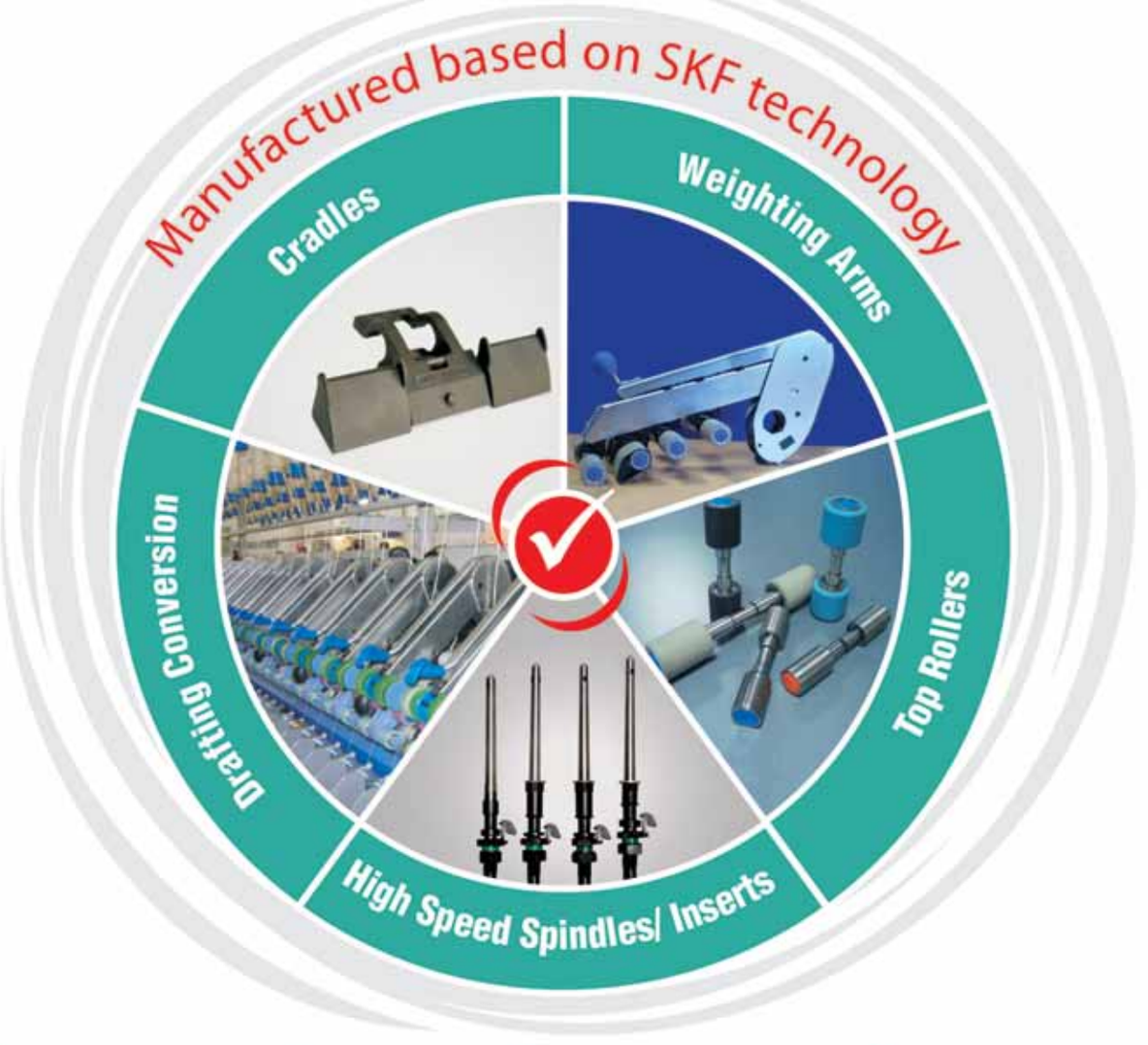

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KEYNOTE SPEAKER

Daniel R Dwight
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DAY ONE: SESSION ONE: THE INDUSTRY

Keynote presentation: Global expansion through sustainability and social responsibility
Daniel R. Dwight, Cooley Group

Coating and laminating technology review *Randy E. Meirowitz, PhD, RnD Solutions, San Diego, CA USA*

The European coating and laminating sector *Ariadna Detrell Agrupació d'Empreses Innovadores Tèxtils*

Nonwovens for coating and laminating– a growing worldwide market *Speaker to be confirmed*
Discussion session 1

SESSION TWO: MATERIALS, TECHNIQUES, AND MACHINERY

Innovative powder impregnation technology *Jérôme Ville, Fibroline France SARL*

An eco friendly applicator – economic aspects and creative potential *Jürgen Hanel, Monforts*

Comparison of different adhesive application methods in the technical textile industry
Stephan Schultheis, ITW Dynatec

Low temperature activation / high temperature resistant lamination using 100% solids adhesive
Michiel van Duijn, MORCHEM

Application of novel atmospheric plasma machine for textiles
Illya Kulyk, Veneto Nanotech
Discussion session 2

DAY TWO

Development in environmental laminating processes and laminated products
Karl Lansu, Klieverik Heli

High technical films and membranes for laminated products
Frans Goossens, Fait Plast Spa

Practical aspects of nanotechnology in coating and laminating *Speaker to be confirmed*

Commercializing technology – printed electronics: a field of the future for coating
Thomas Kolbusch, Coatema

Enhancement of and adding value and function to coating and laminating by digital imaging
Speaker to be confirmed
Discussion session 3

SESSION 3: EMERGING TECHNOLOGIES

Application of biobased and biodegradable materials in textile coating *David De Smet, Centexbel*

Introduction of biocides into coated fabrics – a study of insect repellent and insecticide coatings for textile applications
Helena Esteve, LEITAT Technological Center, Terrassa (Barcelona), Spain

Fibrous transistors: influence of substrate size on copper layer deposition, stability and roughness
Lina Rambausek, Ghent University
Discussion session 4

(Programme subject to change)



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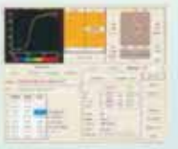

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Contents

Editorial

To be OR not to be

Textile industry is one of the largest and oldest industries in the world. Worldwide, textile production and consumption have followed a long term growth rate of about 2–3% per year, the recent economic recession not withstanding. In the last two decades, textile processing has become increasingly concerned to achieve and demonstrate sound environmental performance by controlling the effect of their activities, products and processes taking into consideration its environmental policies and objectives. For having a sustainable production, these parameters are of immense importance and need to be focused on. Sustain means “to maintain” or “ to uphold” and with regard to industrial processes sustainability means establishing those principles and practices which can help to maintain the equilibrium of nature in other words to avoid causing irreversible damage to the earth's natural resources (needless to say with economic equilibrium too). To move to a larger degree of sustainability in our industrial processes and systems, achieving a better balance between the social, economic and environmental aspects of textile production is required.

The textile industry particularly wet processing sector of its value chain, is one of the most polluting industry sectors. An enormous range and quantity of chemicals are used at every stage and the after- effects in terms of wastewater treatment and air pollution are crucial to manage (Read expert view on this under the column TEXPERIENCE). Thus there is a strong need to establish more sustainable textile processing measures in the industry. Looking at this dire need of the industry, Institute of Chemical Technology (ICT) is organising a conference, “Texsummit 2012” on the topic, “Building a Sustainable Value Chain Through Green Chemistry – FLORISH OR PERISH ?” during ITME 2012 on 5th Dec. 2012.

To maintain and uphold the sustainability of our Journal of Textile Association, efforts are being made to make this esteemed journal as a peer reviewed journal. Peer review is the process of subjecting an author's scholarly manuscript to the scrutiny of others who are experts in the same field, prior to publication in a journal. Peer

review methods are employed to maintain standards, improve performance and provide credibility. Researchers overwhelmingly agree that the main area of effectiveness of peer review is in improving the quality of the published paper, and it improves their own published paper, including identifying scientific errors and missing and inaccurate references. Peer-review is a critical part of the functioning of the scientific community, of quality control, and the self corrective nature of science. For the process, typically, the journal editor will give a submitted paper to a small number of qualified peers – recognized experts in the relevant field. The reviewers will then submit their views on the paper along with a recommendation to reject, accept with major revisions, accept with minor revisions, or accept as is. The process, although at times painful, is quite useful in not only checking the quality of submitted work, but improving the quality.

Since peer reviewing of an article enhances the credibility of the article, the number of other researchers referring it increases and hence the IMPACT FACTOR of the journal increases. I**mpact factor**, often abbreviated **IF**, is a measure reflecting the average number of citations to recent articles published in science and social science journals. The higher the IF, the more academic authors and researchers will want to publish in the journal (as this is an acknowledged measure of the academic worth of their work – and is an influential factor in allocation of research funding and in academic promotion). This will lead to an increase in the quality of papers published and make the results of our research more accessible for industry practitioners.

With a hope of enhancing the standing of our journal, I hope to receive an overwhelming response and support from our readers and authors for our transformation.

Prof. (Dr.) R. V. Adivarekar

Editor, JTA

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Fibre Packing in Modified Ring Yarn

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Abstract
Yarn properties are chiefly dependent on the properties of the constituent fibers and their disposition in the body of the yarn, i.e. the yarn structure. Yarn structure is again influenced by the specific spinning system. Within a system, certain spinning and processing parameters also vary the structure quite significantly. The influence of strand spacing, twist factor and linear density on the packing density of treble rove feed yarn was measured and analysed using ANOVA. There is a high degree of influence of all these variables on the packing of yarn.

Key words
Interaction , Packing Density, Treble rove yarn , Yarn structure, Yarn core and surface.

1. Introduction

Many research workers have studied the yarn structure, and its relation to yarn properties, but they have adopted chiefly the tracer fiber technique of Morton and Yen [1] - not much information is available in the literature on the cross-section cutting method of studying yarn structure. In the cross-section study, the centre of gravity of yarn structure is first calculated and then the area of cross-section is divided into class intervals of equal width as suggested by Hamilton [2]. However, Hearle [3] has preferred zones of equal area so that the fibers are equally distributed among all zones. The results obtained by using both the methods should be identical for the same cross-section provided that they are calculated per unit area.

Irregularities in the distribution of fibers in the yarn cross-section can significantly affect yarn properties. This is particularly true with yarns made from intimate blends of different fiber types, where the appearance and the surface and even mechanical properties will be influenced by the distribution of the blend components in the cross-section [4].

In the polyester cotton blended yarns, as a consequence of the manner in which spinning is made; distribution of different fibers in the yarn cross-section is also possible.

This study aims to understand the nature of fiber packing of the treble rove feed yarn.

2. Methodology

2.1 The Machine

The machine used in this study is Lakshmi Rieter G5/1 ring frame of 70mm gauge, 144 spindles, 210 mm lift and 36 mm ring diameter specification. It was employed to conduct various trials. However, the ring frame as such could not be used since this study involved feed of 3 roving to a spindle in such a manner that the cotton component occupied the cover material, and polyester staple occupied the core material. Hence, minor modifications were made in the ring frame. The resultant mixing composition was 67% cotton and 33% polyester.

2.1.1. Modifications at Ring Frame

The following modifications were made to the ring frame

- Roving separator guide fixed at the rear side of the back drafting roller and middle drafting roller.
- Roving traverse motion was disconnected.
- Grooved bar mechanical system was fixed separately.

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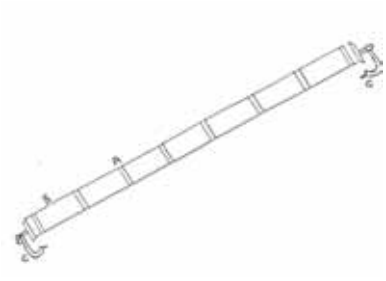

Figure 2.1: Grooved bar system

A - Groove
B - Groove Plate
C - Plate holder

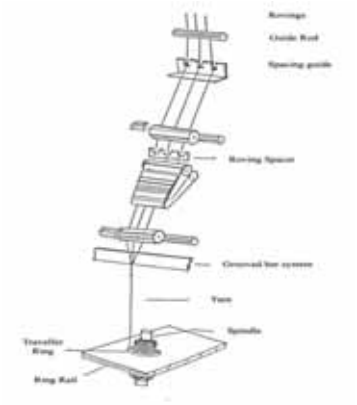

Figure 2.2 : Material flow through grooved bar system

2.1.2. Feature of Grooved Bar

Mechanical System :

- Specification

  Total length : 530 mm
  Depth of Groove : 1 mm
  Width of Groove : 1 mm
  Length of Groove : 10 mm

- It is fixed on the drafting roller stand, after front roller nip, so that the middle polyester strand passed under the controlled path of the groove. This arrangement made the tail ends of the relatively short-cotton fibres of the two outside strands to migrate freely, entangle and spin around the polyester strand.

This system gave required tension to the three strands, enabling the cotton strands to cover the polyester.

2.2. Preparation of the yarn samples

Details of polyester and cotton fibers used in this study are given in Tables 2.1 and 2.2 respectively. Polyester staple fibers supplied by a commercial fiber producer were used.

Table 2.1 : Polyester Fiber Properties

Fiber length (mm)	38
Fiber denier	1.2
Fiber Tenacity (cN/Tex)	60.3
Elongation at break (%)	5
Spin finish (%)	0.18

Table 2.2 : Cotton Fiber Properties

Cotton Fiber	**DCH 32 (100%)**
2.5 % Span length (mm)	28.40
50 % Span length (mm)	13.99
Tenacity (cN/Tex)	25.2
Micronaire value	3.2
Trash content (%)	4.2
Maturity co-efficient	0.82
Uniformity Ratio	49.0
Elongation at break (%)	5.2

The polyester and cotton materials were processed from blow room to speed frame in the usual manner. In the cotton material, about 15% short fibers were combed. The roving so produced was fed to ring frame. The rove having a hank of 0.2 k.tex (3.0 Ne) was the feed stock to ring frame for the spinning of 36.9, 19.7, 14.8, 11.8 and 9.8 Tex (16, 30, 40, 50, 60 Ne) yarns.

2.2.1. Process Variables

Three levels of Twist factors namely, 38, 42 and 46 tex $^{0.5}$tp cm, and three levels of strand spacing namely 0mm, 4mm and 8mm were used for producing treble rove blended yarn of 33% polyester and 67% cotton in this study in order to ascertain the influence of strand spacing and twist on yarn properties.

2.3 Testing Methods

All the samples were conditioned at 65^0 + / - 2 % RH and 25^0 +/- 2 ^{0}C for 48 hours before taking up for testing.

Packing density of yarn was measured using commercially available projection microscope with a magnification of 750X. The diameter of the yarn was measured using the scale, which is provided on the ground glass. Twenty places per sample were viewed and the diameters were noted at those places to get an average value.

3. Results & Discussions

3.1. Packing Density

Fiber packing densities of each zone, may be defined as the ratio of the area of fiber in the zone to the total area of the zone (i.e. Af / Az). In order to compare the yarns produced at different strand spacing and twist levels and thus of different average radius, the radical position of each zone in the section was expressed as a fraction of the yarn radius (R). In these measurements, the radius of a given zone was taken as the distance from the yarn axis to the point midway between the two circular boundaries of that zone, and the yarn radius was considered to be the distance from the yarn axis to the point midway between the two boundaries of the outer most zones measured. Thus in essence the procedure followed is similar to the technique developed by Hickie and Chaikin [5] for studying the fiber packing density of worsted yarn. The maximum packing density occurs in a region located approximately at one third to two third of yarn radius from the yarn axis. This phenomenon was also observed by Hickie and Chaikin [5] in worsted yarns, Ishtiaque and others [6] in SIRO yarns and Chasmalwala and Sundaresan in Air jet spun yarn [7].

The fiber packing density in the yarn body is not uniform across the yarn cross-section nor is it maximum at the core. The results in the Table 3.1 indicate that most of these yarns are slightly hollow at the center.

Table 3.1 : Packing Density of Treble rove feed yarn at different radial positions

TEX	TF	SS mm	Packing Density				
			Core to Surface (r/R)				
			0.11	0.33	0.55	0.77	1.00
		0	0.227	0.350	0.264	0.092	0.008
	38	4	0.314		0.288	0.118	0.009
		8	0.328	0.378	0.324	0.140	0.100
		0	0.214	0.414	0.330	0.137	0.001
	42	4	0.232		0.387	0.186	0.009
		8	0.264		0.384	0.100	0.001
		0	0.282	0.350	0.324	0.100	0.001
	46	4	0.344	0.384	0.384	0.170	0.005
		8	0.340	0.424	0.428	0.260	0.001
				0.382			
				0.396			
				0.410			
				0.424			
				0.438			
				0.452			
				0.466			
				0.480			
				0.494			
				0.508			
				0.522			
				0.536			
				0.550			
				0.564			
				0.578			
				0.592			
				0.606			
				0.620			
				0.634			
				0.648			
				0.662			
				0.676			
				0.690			
				0.704			
				0.718			
				0.732			
				0.746			
				0.760			
				0.774			
				0.788			
				0.802			
				0.816			
				0.830			
				0.844			
				0.858			
				0.872			
				0.886			
				0.900			
				0.914			
				0.928			
				0.942			
				0.956			
				0.970			
				0.984			
				0.998			

TEX	TF	SS mm	Packing Density				
			Core to Surface (r/R)				
			0.11	0.33	0.55	0.77	1.00
				0.382			
				0.443			
				0.488			
		0	0.421	0.450	0.381	0.140	0.002
	38	4	0.475	0	0.481	0.230	0.005
		8	0.480	0.591	0.514	0.250	0.010
		0	0.272	0.613	0.370	0.163	0.005
19.7	42	4	0.325	3	0.380	0.180	0.009
		8	0.364		0.418	0.222	0.012
		0	0.360	0.382	0.432	0.162	0.007
	46	4	0.382	0.410	0.450	0.180	0.025
		8	0.424	0	0484	0.225	0.020
				0.425			
				0.462			
				0.484			
				0.510			
		0	0.280	0.360	0.275	0.125	0.004
	38	4	0.306	0	0.313	0.100	0.009
			0.325	0.373	0.325	0.125	0.011
		0	0.325	0.380	0.285	0.108	0.007
14.8	42	4	0.346	0	0.324	0.168	0.009
		8	0.368		0.350	0.104	0.011
		0	0.325	0.378	0.290	0.128	0.009
	46	4	0.350	0.389	0.328	0.142	0.012
		8	0.412	0.420	0.375	0.200	0.015
				0.376			
				0.396			

TEX	TF	SS mm	Packing Density				
				Core to Surface (r/R)			
			0.11	0.33	0.55	0.77	1.00
				0.438			
		0	0.224	0.375	0.321	0.138	0.005
	38	4	0.360	0.405	0.350	0.148	0.009
		8	0.410	0.426	0.370	0.172	0.014
		0	0.385	0.436	0.390	0.149	0.008
11.8	42	4	0.410	0.439	0.401	0.200	0.010
		8	0.426	0.480	0.425	0.216	0.012
		0	0.385	0.461	0.432	0.188	0.005
	46	4	0.398	0.483	0.431	0.198	0.011
		8	0.484	0.532	0.468	0.321	0.015
		0	0.513	0.555	0.478	0.225	0.008
	38	4	0.525	0.585	0.520	0.287	0.016
		8	0.542	0.600	0.558	0.312	0.024
		0	0.055	0.612	0.544	0.275	0.004
9.8	42	4	0.581	0.620	0.555	0.282	0.008
		8	0.592	0.627	0.561	0.297	0.012
		0	0.524	0.627	0.548	0.225	0.009
	46	4	0.568	0.650	0.582	0.256	0.015
		8	0.589	0.668	0.594	0.287	0.020

3.1.1 Effect of Strand Spacing, Twist, Linear Density on Yarn Packing with respect to radial position

The individual and interaction effect of Strand spacing, Twist and Linear density on the packing density of the yarn with respect to the radial position was analysed using ANOVA and the results are tabulated in the Table 3.2. As the strand spacing increases, the yarn packing density also increases significantly for all counts. This is due to greater consolidation of structure at higher strand spacing as confirmed by Thulasiram [8].

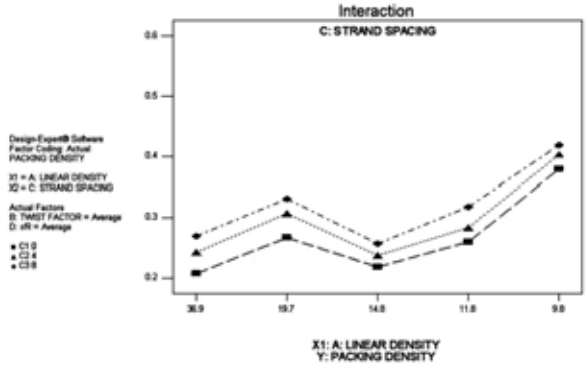

Figure 3.1: Interaction between Linear Density and Strand spacing on packing density

Obviously, as twist increases, the packing density also increases. The packing is found to be better for increasing linear densities of the yarn. Except the interaction effect of linear density and strand spacing (AC in Table: 3.2 for which F > 0.05) the other interaction effects are highly influencing the packing density of the treble rove feed yarn

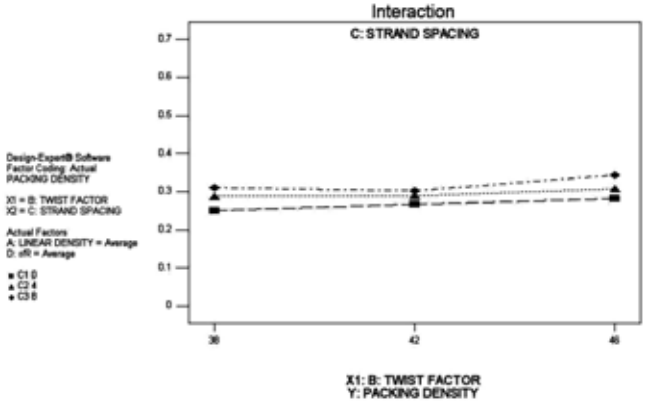

Figure 3.2 : Interaction between Twist Factor and Strand spacing on packing density

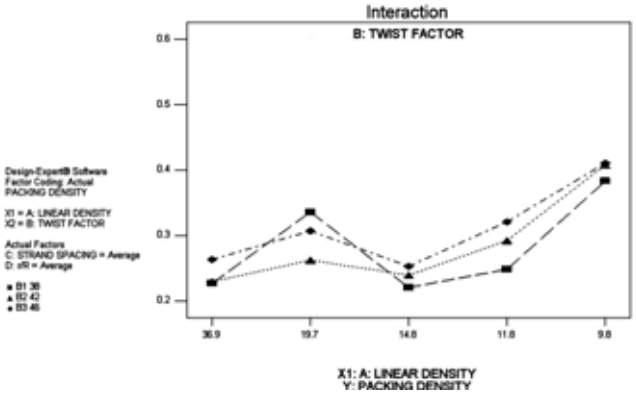

Figure 3.3: Interaction between Linear Density and Twist Factor on packing density

Texttreasure

A life spent making mistakes is not only more honorable, but more useful than a life spent doing nothing.

- George Bernard Shaw

Table 3.2: Influence of Count, Twist Factor and Linear Density and their interaction on the packing Density of Treble Rove feed Yarn (ANOVA)

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F
Model	7.822	96	0.0815	211	< 0.0001
A-Linear	0.7903	4	0.1976	511.7	< 0.0001
Density					
B-Twist	0.0351	2	0.0175	45.45	< 0.0001
Factor					
C-Strand	0.1035	2	0.0518	134	< 0.0001
Spacing					
D-r/R	6.4467	4	1.6117	4174	< 0.0001
AB	0.0736	8	0.0092	23.84	< 0.0001
AC	0.0057	8	0.0007	23.84	0.0742
AD	0.2653	16	0.0166	42.95	< 0.0001
BC	0.0069	4	0.0017	4.451	0.0021
BD	0.018	8	0.0023	5.831	< 0.0001
CD	0.0149	8	0.0019	4.823	< 0.0001
ABD	0.0619	32	0.0019	5.012	< 0.0001
Residual	0.0494	128	0.0004		
Cor Total	7.8714	224			

4. Conclusions

The following conclusions are drawn from the research work;

- The maximum radial packing occurs at a distance of one third of the yarn radius from the axis of the yarn.
- The overall packing density is found to increase with twist level and strand spacing within the experimental range.
- Increase in linear density tends to increase the packing density of yarn.
- Combined effect of linear density and strand spacing on packing of yarn is found to be marginally significant.

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Bamboo Fibre and its Properties

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Abstract

A bamboo fabric has a good reputation for the benefit to both human and earth in the clothing industry. A bamboo fibre is soft, absorbs good amount of moisture, strong and breathable. It grows very fast and can ready for harvesting in a span of four years which does not require replanting. The main chemical component is cellulose of about 57-63% and the most significant chemical component in the bamboo chemical constitution is 2.6-bimethoxy -p-benzoquinone called bamboo kun which is responsible for its extraordinary fungal and bacterial resistance. The products of the bamboo fibres are suitable for wide range of end uses in apparel industry starting from surgical cloths to hygiene cloths and from bedding fabrics to bathrobes.

Key words

Antimicrobial, Bamboo, Breathable, Kun, Morpholgy, Soft.

1. Introduction

A bamboo fabric has a good reputation for the benefit to both human and earth in the clothing industry. A bamboo fabric is soft to touch and stronger, very breathable and can absorbs 3-4 times more water than the traditional cotton fabrics with out sticking to skin. This article attempts to highlight ecological reasons for using bamboo as a raw material in textile and clothing applications.

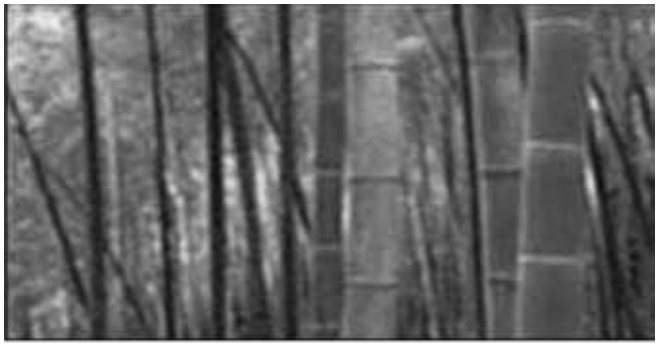

Figure 1.1: Bamboo grove

The bamboos are called as "the friend of people" in China, "the wood of poor" in India and "Brother" in Vietnam. There are about 1500 species of bamboo across the world and about 50 of these are commercially involved in trade. Bamboo grows very fast and can ready for harvesting in a span of four years which does not require replanting. Bamboo's are tapered cylindrical shaped grass and attains the height of 20-25 meters.

The production of bamboo fibres scientifically dates back between 1900 to 1950s.The 1st US patent towards bamboo fibre textiles was made by Philipp Lichtenstadt in 1864 (IS patent and trade mark office 2008).This patent out lined the invention of new and useful process for disintegrating the fibre of bamboo, so that it may be used in manufacture of the cloths. The process described is; Take the bamboo and cut out the joints-Split up the bamboo's in to pieces of slivers of half an inch roughly in width-pickle bamboo in solution of clear lime water, nitrate of soda and oxalic acid. Remove pickled bamboo after twelve to twenty four hours in order to boil in a solution of soda ash, crush and devil (comb, card, or heckle) the material, spin in to cardage, yarn or other forms for manufacturing [1]. Bamboo fibre was first manufactured in 2002 in China by "Hebei Jigao" chemical fibre Co Ltd, which appeared recently in textile market for apparels. The products of the bamboo fibres are suitable for wide range of end uses in apparel industry starting from surgical cloths to hygiene cloths and from bedding fabrics to bathrobes [2].

Botanically bamboo is classified as; [3]

1	Kingdom	:	Plantae
2	Division	:	Magnoliophyta
3	Class	:	Liliopsida

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4	Sub Class	:	Commelinidae
5	Order	:	Cyperales Gramineae
6	Sub Family	:	Bambusoideae
7	Tribe	:	Bambusinae

The bamboo culm consists of about 40% fibres and rest are plant Cells. The fibres constitute the 60-70% of the total culm tissue. The Percentage of fibres increases from the bottom to the top of the culm. Bamboo fibre length varies from 1 to 5 mm (avg of 2.8 mm) and dia of 14-28 μm (avg of 24μm). The main chemical component is cellulose of about 57-63% and the most significant chemical component in the bamboo chemical constitution is 2.6-bimethoxy -p-benzoquinone called bamboo kun which is responsible for its extraordinary fungal and bacterial resistance [5, 6].

2. Fibre Morphology

Bamboo fibres are long cylindrical with tapered end and uniform in size with out convolution as there in cotton. There are lumen structures with wall about 5μm in thickness in cross section and obvious nodes in length wise direction. The avg width of bamboo fibres is about 12.38 μm. The bamboo fibre has a smaller orientation angle for the exterior microfibres which are approximately parallel to the fibre axis. The length of the bamboo fibres is only about 2.5 mm and to form a long textile fibre a number of single cells are connected together by some binding agents such as lignin, pectin etc. [7].

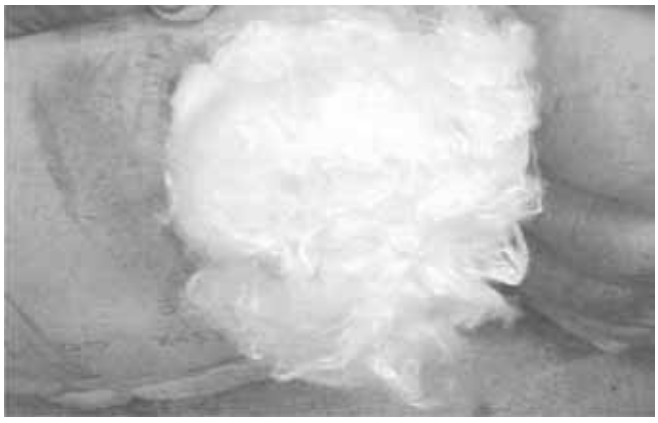

Figure 2.1: Opened bamboo fibre

The cross sectional image of the regenerated bamboo is not circular and it is quite similar to regular viscose rayon fibre. The void present in the fibre structure has higher moisture absorption capacities and less orientation of the fibre molecules. The dry tenacity, elongation at break and moisture absorption is similar to that of viscose fibre and wet tenacity is slightly higher than that of the viscose rayon [8].

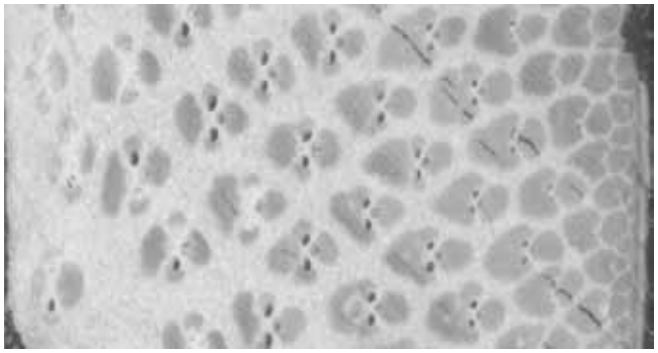

Figure 2.2: Cross section of bamboo culm (magnification 10X) [4]

Like other natural fibres, bamboo fibres are very hygroscopic in nature and tend to exhibit moisture equilibrium with the relative humidity of the surrounding atmosphere either by taking up moisture from or giving out moisture to the atmosphere. They tend to swell and shrink when exposed to cold and hot weather conditions. This due to the presence of plenty of reactive groups in it as the moisture is attracted through H-bonding [9].

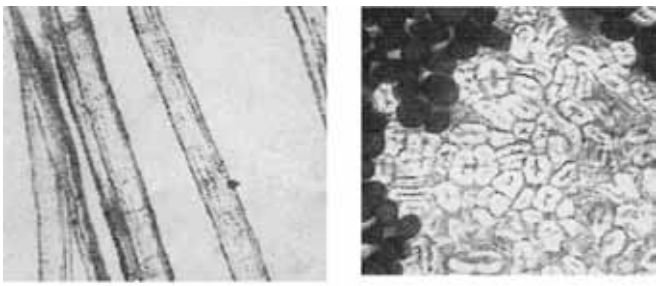

Figure 2.3: Longitudinal and cross sectional view of natural bamboo fibre

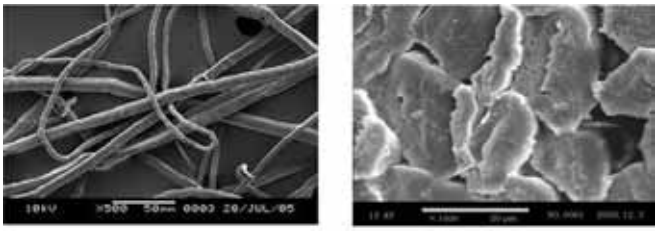

Figure 2.4 : Length and cross section of bamboo fibre observed by SEM

Physical Parameters of Bamboo fibre are given in Table 2.1. [3, 10, 11, 12].

Texttreasure

No road is too long for him who advances slowly and does not hurry, and no attainment is beyond his reach who equips himself with patience to achieve it.

- Jean de La Bruyère

Table 2.1: Physical parameters of bamboo fibre [3]

S.N.	Parameters	Reference data
1	Dry tensile Strength	2.33 (cN/dtex)
2	Wet tensile Strength	1.37 (cN/dtex)
3	Dry elongation at break	23.8%
4	Linear density % of deviation	-1.8%
5	% of length deviation	-1.8%
6	CV of dry tenacity	13.42%
7	Whiteness	69.6%
8	Oil content	0.17%
9	Moisture regain	13.03%

3. Properties/Features/Benefits of bamboo fibres

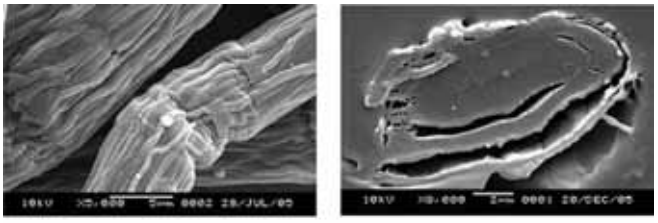

Figure 3.1: Bamboo fibre microfibrillar configuration and concentric lamina structure.

- Softer than cotton, feel similar to that of cashmere and silk blend.
- Due to its cross section of various micro gaps and microholes, it has good moisture absorption and ventilation properties
- The moisture absorption properties are twice that of cotton.
- Extraordinary soil release property.
- Due to bamboo Kun, it has excellent natural anti-microbial properties.
- Can absorb and evaporate human sweat in split of seconds just like breathing, which keeps wearer extremely cool, comfortable and non sticking to skin in hot summer.
- 100% bamboo fibres have good elasticity, nearly 20%.
- Bamboo fabrics need less dyestuff than cotton and better dye stuff absorption and shows better colors.
- Bamboo fibre fabrics are more antistatic than any other fabrics and got natural deodorizing property.
- It has very fine thinness degree and whiteness close to normal finely bleached viscose and has strong durability and abrasion resistance.
- Anti ultraviolet nature make it suitable for summer clothing's and children wear. [13, 14, 15].

4. End uses of Bamboo Fibre

Bamboo Intimate Apparels: Underwears, Tight t-shirts, Socks, Sweaters, Bath suits, Mats, Blankets, Towels. Bamboo non woven fabric: Hygiene materials such as sanitary napkins, Masks, Mattress, Food packing bags. Bamboo sanitary materials: Bandages, Masks, Surgical clothes, Nurses wears, Sanitary towels, Operation coats. Bamboo bathroom series: Bamboo towels, Bath robes etc.Bamboo decorating series: Curtains, Wall papers, Sofa covers, Television covers, Bed covers, Bed sheets [16].

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Characteristics of Pre-heated Air Jet Textured Yarns

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Abstract
In order to understand the influence of pre-heating temperature on the characteristics of air jet textured yarns, the polyester filament yarns were air texturized at different pre-heating temperatures in dry, pre-wet, with and without post heating. The air jet textured yarns were tested for linear density, bulk and loop instability. The air textured yarns linear density and bulk increased by pre-heating, pre-wetting and post heating. With increase in pre-heating temperature, the physical bulk of air textured yarns increased in dry condition and decreased in wet condition. However, the trend was found to be opposite when the post heater was not used. The loop stability of post heated and pre-wet textured yarns was found to be better than post heated and dry textured yarns. There was no significant effect of pre-heating on the strength and breaking elongation of air textured yarns.

Keywords
Bulk, Linear density, Loop instability Pre-heating, Post-heating.

1. Introduction

Air-jet texturising process is essentially a mechanical process in which a bundle of filaments is overfed into a turbulent air-stream where individual filaments are separated and arcs and loops are formed at randomly spaced longitudinal intervals with intermittent straight portions [1]. Upon emergence from the jet, the yarn bundle collapses and the looped filaments become locked in place by interfilaments friction. The structure so formed resembles a spun yarn [2]. M. Acar, G. R. Wray and Bock and Lunenschloss [1, 3] have investigated the air textured yarn structure in detail. The physical, mechanical and aesthetic characteristics of air textured yarns are influenced by the type, frequency and size of loops projecting from the surface of the yarn. Fischer [4] and others have provided evidence to claim that there is no change in the physical or mechanical properties of individual filaments comprising the air textured yarn structure and therefore, properties such as dyeing characteristics like levelness and uptake are almost unchanged. The main processing variables in air-texturising are overfeed, production speed, air pressure, stabilizing tension and temperature and operating conditions such as dry or wet.

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The physical bulk and tensile properties of air-textured yarns are influenced by the loops formed on their surface. The loops formation ability is improved by water application in the regular air textured yarn manufacturing process. The loop formation ability of filament is dependent on its modulus and lower modulus improves the loop forming ability of the filament. The modulus of filament could be reduced by thermal heating. European Patent [5] and United States Patent [6] disclosed the use of pre heating for producing an air jet textured polyester yarn having low dry heat shrinkage. However, there is no published literature on pre- heated air-jet textured yarns manufacturing. Therefore, this work was undertaken to investigate the influence of pre-heating temperature on the characteristics of air jet textured yarns.

2. Materials and methods

2.1 Materials

Fully drawn polyester multifilament yarn of 70 dtex (34 filaments) was used as feed yarn.

2.2 Methodology

Air-jet textured yarns were produced using Himson HJT-1000 air-texturising machine. To understand the effect of pre-heating on filament yarn, the feed yarn was heated from 80ºC to 160ºC with an interval of 20 ºC using a hot pin before its entry to the feed rollers and the other processing parameters were kept constant. The processing parameters were as follows :

Delivery speed	:	300 mpm
Overfeed to jet	:	15%
Stabilizing heater temp	:	180o C
Stabilizing Overfeed	:	1.5%
Take up underfeed	:	0.8%
Water application	:	1 lit /
hr / jet Air pressure	:	8 kg / cm²

2.3 Testing

2.3.1. Loop Instability

Instability of the textured yarn was measured by DuPont method [7]. Minimum and maximum tensions of 0.088 and 4.4 cN/tex were kept during testing. Twenty readings were taken for each sample to obtain the average instability percent.

2.3.2. Physical bulk

Physical bulk of air-jet textured yarns was measured using the modified DuPont method [7]. Cylindrical package was wound under a fixed tension level at a winding speed of 150 m/min. The physical bulk of the textured yarn is given by the following relationship :

$$\text{Physical bulk \%} = \frac{\text{(Density of parent yarn package (g/cm3)}}{\text{(Density of textured yarn package (g/cm3)}} \text{X } 100\%$$

2.3.3. Loop configuration

Carl zeiss projecting microscope with 25x magnification was used to have quantitative analysis of loop size and loop frequency. A pretension of 0.02cN/tex was used during projection. The individual height of each loop was measured to calculate loop size and mode value of loop size statistically. The loop frequency was measured by counting the number of loops/unit length. For these measurements a particular horizontal plane of focus passing through the yarn axis was selected such that it gives maximum core diameter [8].

3. Results and Discussion

3.1 Effect on linear density

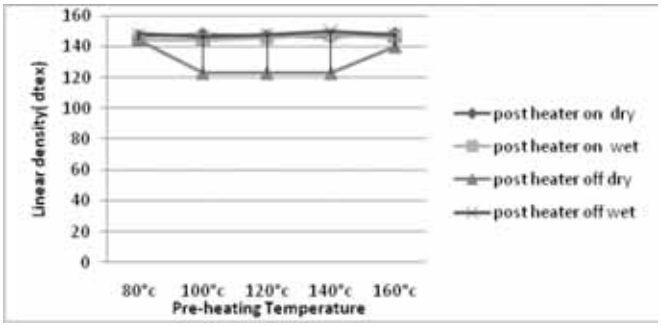

Figure 3.1: Effect of pre-heating temperature on linear density

The effect of pre-heating temperature on air jet textured yarns produced at dry, wet, with and without post heater is shown in Fig. 3.1. There is significant effect of pre-heating temperature on the linear density of air jet textured yarn produced at different conditions. However, there is no significant difference in the linear densities of yarns produced at different conditions except the yarn produced in dry condition without preheating. The linear density of yarns increases with increase in pre-heating temperature due to the increase in shrinkage of the filament as the shrinkage of the filament increases with temperature of heating. The shrinkage of the filament increases the mass per unit length of filament and the linear density increases [9]. The increase in linear density with increase in preheating temperature may also be due to the improvement in the loop forming ability of filaments. The higher preheating temperature reduces the bending resistance of filament and due to the reduction in bending resistance, the filament bends easily and forms more loops. More number of loops on yarn surface also increases the loop frequency and mass per unit length. The yarn produced in dry condition without post heating shows lower linear density than the other textured yarns. The lower linear density of this yarn may be due to non shrinkage of filament in the absence of post heating as well as non application of water on the filament surface before the air jet. Therefore, it can be understood that the linear density of air textured yarns is influenced by pre-heating, post-heating and pre-wetting.

3.2 Effect on physical bulk

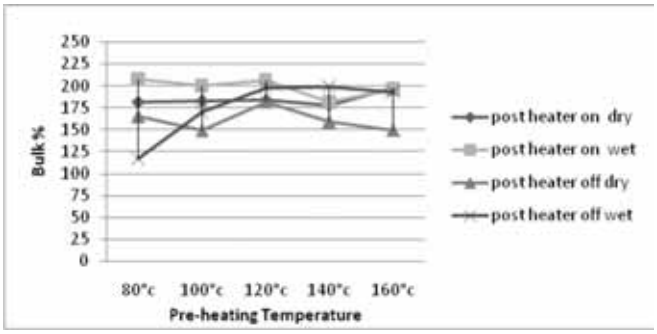

Figure 3.2: Effect of pre-heating temperature on bulk

The effect of pre-heating, dry texturing, pre-wet texturing and post heating on the physical bulk of air textured yarns is shown in Fig. 3.2. There is significant effect of pre-heating temperatures on the bulk of air textured yarns. The conditions of texturising also have significant effect on the bulk of air textured yarns. It is

interesting to observe that the physical bulk of air textured yarns increases in dry condition and decreases in wet condition with increase in pre-heating temperature when the post heater was used [10]. However, the trend is opposite when the post heater was not used. The pre-heating has significant effect on the bulk of air textured yarns due to the reduction in the modulus / stiffness of filament. The physical bulk of air textured yarns is due to the loops formed on the yarn surface. The Higher loops on yarn surface, the higher the bulk of yarn. The change in pre-heating temperature changes the stiffness and bending resistance of filament. Therefore, the pre-heating has significantly affected the bulk of air textured yarns. The increase in the bulk of yarns in dry condition when the post heating is used may be due to the exposure of more filaments to the post heating. The wet condition generated more loops and more loops indicate more filaments on yarn surface. These more filaments come in contact on post heater and tend to shrink. The shrinkage of loop reduces the size of loop and the bulk decreases, where as in case of dry textured yarns the numbers of loops on yarn surface are lesser than pre-wet textured yarns. Therefore, fewer filaments are exposed to the post heating and thus less reduction in loop size and shrinkage. Due to less reduction in loop size, the bulk of yarn is maintained at high level in dry condition.

This behavior is opposite when the post heating is not used. The reason is that the higher loops formed by wet condition, are maintained throughout the process as there is no heating and hence no shrinkage. When the post heating is not used then the pre-heating along with water application increases the numbers of loops and bulk of yarn. However, in case of dry texturing, the improvement in loops formation and bulk is only due to pre-heating. The role of pre heating in improving loops is already explained. The higher loops of wet textured yarns are due to their higher loop forming ability of filament. The water applied on the filament during wet texturing improves the loop forming ability of filament by two means, first one is that the water applied on filament separates the filament in the yarn and separated filament can easily bend due to its higher fineness, secondly the water applied on the filament reduces the friction between filament and jet inlet surface, but increases the friction at jet exit. Due to the difference in friction created by water application, the front end of filament moves at slower rate and back end moves at faster rate. This results in the bending of filament and formation of the loop. Therefore, the pre-heated yarn produced at wet condition reported higher bulk than dry condition. This behavior clearly reveals that the air textured yarns bulk could be improved by pre-heating, pre-wetting and post heating

3.4 Effect on loop stability

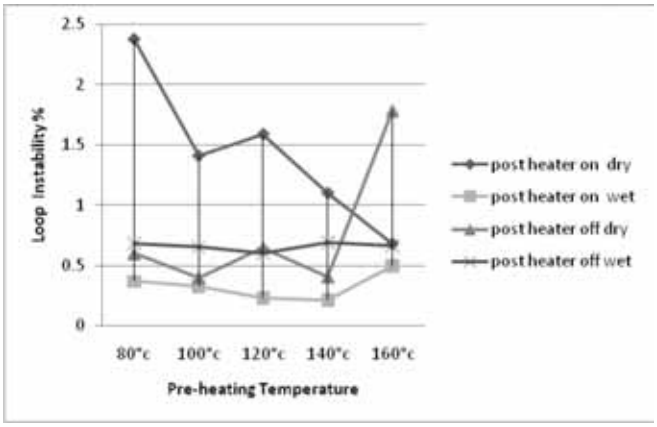

Figure 3.3 : Effect of pre-heating temperature on loop instability

Loop instability was determined by the DuPont method in which the lose loops were extended by the application of weight. The value of loop instability is inversely proportional to the loop stability. The effect of pre-heating temperature on the loop instability of air textured yarns at different conditions of texturising is shown in Fig. 3.3. There is significant effect of pre-heating temperature on loop instability of air textured yarns. The dry and pre-wet conditions also have significant effect on the loop instability of air textured yarn. The loop instability of post heated and dry textured yarn is higher than the yarn produced in post heated and pre-wet textured yarn. It means the loop stability of post heated and wet textured yarns is better than post heated and dry textured [3].

The different pre-heating temperatures have shown different loop instability because the loop stability is related to the interlocking of filaments in the core of the yarn. The yarn core with high entanglements results in good loop stability. The large size and more number of loops in yarn result in poor loop stability. The pre-heating again has shown different trends of loop stability in different conditions of texturising. The loop instability of air textured yarns decreases with increase in pre-heating temperature in dry and pre-wet texturing and without and with post heating. The improvement in loop stability of air textured yarns with increase in pre-heating temperature in both conditions is due to the

reduction in stiffness of filament and increase in the flexibility of filament. The flexible filament migrates better in the core of yarn. Good migration of filament increases the locking of filament in the core.

It is also interesting to learn from the data that the pre-wet textured yarns have shown lower loop instability as compared to dry textured yarn. This is due to the reduction in friction between filaments by the water application. Due to reduced friction, the filament separates easily and separated filament is very fine in its size. The fine filament migrates and entangles better in the core of the yarn. Therefore, pre-wet textured yarns exhibited good loop stability. The pre-wetting again removes spin finish from the surface and increases the friction between filaments and better interlocking of filament results.

Regarding the influence of post heater on the loop stability of air textured yarn, the role of post heater in dry and pre-wet condition is different. The loop stability is better if the post heater is not used in dry condition. However, better loop stability is observed in wet condition when the post heater is used. It means, the post heating results in better loop stability, if textured in wet condition. In this case, the post heating as well as pre-wetting have played important role in improving loop stability of yarn. A good air jet textured yarn is the one with higher physical bulk and good loop stability [2, 3]. This higher bulk and good loop stability is resulted by air jet textured yarns produced with pre-wetting and post heating.

3.5 Effect on tensile strength

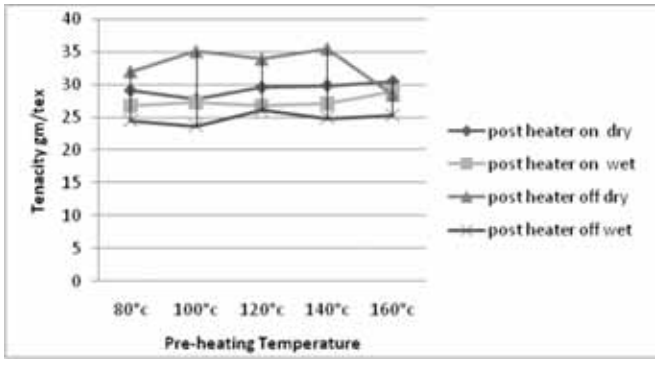

Figure 3.4 (a) : Effect of pre-heating temperature on tensile strength

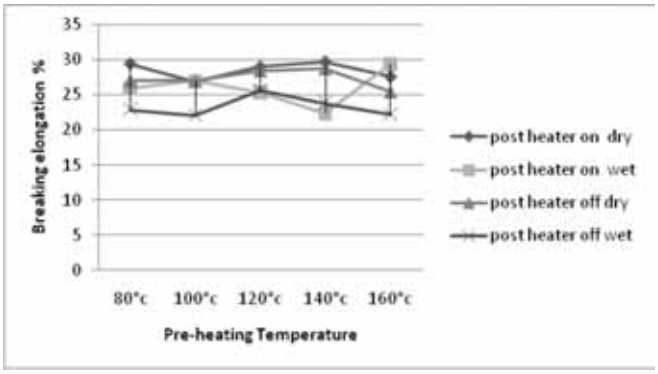

Figure 3.4 (b) : Effect of pre-heating temperature on breaking elongation

The effect of pre-heating on strength and breaking elongation of air textured yarns at different conditions of texturising is shown in Fig. 3.4a and Fig. 3.4b respectively. There is no significant effect of pre-heating temperatures on the breaking strength and breaking elongation of air textured yarns. However, there is significant effect of dry and wet texturing on strength and elongation of air textured yarns. Post heating is also not having much significant effect on strength and elongation of air textured yarns. It means texturing in dry and wet condition alone influences the strength and elongation of air textured yarns. The strength and elongation of air textured yarns is largely dependent on its structure i.e. arrangement of filaments in yarn structure. The higher entanglement with highest number of loops reduces the strength as well as breaking elongation of air textured yarns. In both the conditions, wet texturing results in better migration, better entanglement and higher number of loops [11]. Therefore, the wet textured yarns in pre-heating as well as post heating, have exhibited lower strength and breaking elongation. The higher breaking strength and breaking elongation, at all temperatures of pre-heating and post heating, is due to the less migration, less entanglement and less number of loops.

4. Conclusions

- The linear density of yarns increased with increase in pre-heating temperature. The yarn produced in dry condition without post heating showed lower linear density than the other textured yarns. The linear density of air textured yarns is influenced by pre-heating, post-heating and pre-wetting.

- There is significant effect of pre-heating temperatures on the bulk of air textured yarns. The physical bulk of air textured yarns increased in dry

condition and decreased in wet condition with increase in pre-heating temperature when the post heater was used. However, the trend was opposite when the post heater was not used.

- There is significant effect of pre-heating temperature on loop instability of air textured yarns. The dry and pre-wet conditions also have significant effect on the loop instability of air textured yarn. The loop instability of post heated and dry textured yarn was higher than the yarn produced using post heating and pre-wetting. Pre-wet textured yarns have shown lower loop instability as compared to dry textured yarn.

- There is no significant effect of pre-heating temperatures on the breaking strength and breaking elongation of air textured yarns. However, there is significant effect of dry and wet texturing on strength and elongation of air textured yarns.

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Studies of Bi-Functional Reactive Dyes on Viscose Rayon Filament Yarn

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Abstract
In this study, the influence of change in various dyeing parameters in the dyeing of viscose rayon filament yarn is investigated. The material is dyed with a bi-functional reactive dye (Novacron Yellow S-3R) under different set of dyeing conditions. The shade depth of the samples so obtained has been measured and compared. This has lead us to finding the most suitable method for the dyeing of viscose rayon filament yarn, from the economy and quality point of view at a specified shade depth of 2% for the dye under consideration.

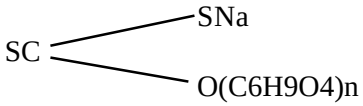
Key words
Cost, Dyeing, Fastness, K/S value, Viscose rayon.

1. Introduction

Viscose is generally dyed with Vat and Reactive dyes, while small amount of Sulphur and Azoic colors are also used. Reactive dyes commands the largest share in the processing of viscose and with constant improvements coming up in reactive dyes, which are making them better in their fastness profiles and increasing their solubility for dyeing of deeper shades while keeping the cost low, use of reactive dyes is further poised for a growth[2].

1.1 Viscose Rayon

Viscose Rayon, like cotton, is a cellulosic material but viscose possesses a lower degree of polymerisation as compared to cotton, so its tendency to pick up dyes is not same as that of cotton [1]. It is the sodium salt of cellulose xanthic acid [2].



It is obtained by the action of carbon disulphide on alkali cellulose. This substance forms a viscous solution in which the long chain structure of the cellulosic molecules are retained.

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2.Materials and Methods

2.1. Sample for the study

The sample taken for the study was Grey, 100% viscose rayon filament yarn, 120 denier X 2 (d.p.f=3), twisted, supplied by Century Rayon (India).

Sample of Novacron Yellow S-3R, was supplied by Huntsman (India). All other chemicals were supplied by Tata Chemicals (India).

2.2. Methodology

2.2.1. Scouring of Viscose Yarn

The viscose yarns were scoured before dyeing with 0.5 gpl soap at 600C for 15 minutes.

2.2.2. Preparation of Dyeing Solution

The dye (Yellow S-3R) was weighed 1 gm. and then water was added to make the volume 100 ml, so as to get a stock solution of 1%. A freshly prepared stock solution was used.

2.2.3. Dyeing Procedure

The scoured viscose was properly wetted before entering the material into the bath. The dye bath was set at 600C with an M.L.R of 1:30 and the required amount of dye solution was added to the dye bath. The material was then entered into the bath. It is then run in the dye solution as per the time specified in Table 2.1. Then the required amount of salt was added to the bath in two instalments and the material was run as per specified time. After the time is over, required amount

of soda ash was also added in two instalments and the bath was run for specified time.

After the completion of Dyeing, the material was given a rinse followed by neutralization wash with acetic acid which is further followed by soaping treatment at a temperature of 900C. The soaped material was then rinsed twice and then dried in a hot air oven.

Table 2.1: Dyeing Parameters of the samples dyed using Novacron Yellow S- 3R for Shade Depth 2%

S.No.	Run Time (Dye Sol.)	Run Time Salt	Run Time (Soda Ash)	(Salt) (gpl)	Soda Ash (gpl)
1	5	10	20	40	11
2	5	10	20	48	11
3	5	10	20	60	11
4	5	10	20	75	11
5	5	10	20	40	7
6	5	10	20	48	7
7	5	10	20	60	7
8	5	10	20	75	7
9	5	10	20	40	14
10	5	10	20	48	14
11	5	10	20	60	14
12	5	10	20	75	14
13	10	20	40	40	7
14	10	20	40	48	7
15	10	20	40	60	7
16	10	20	40	75	7
17	10	20	40	40	11
18	10	20	40	48	11
19	10	20	40	60	11
20	10	20	40	75	11
21	10	20	40	40	14
22	10	20	40	48	14
23	10	20	40	60	14
24	10	20	40	75	14
25	10	50	70	40	7
26	10	50	70	48	7
27	10	50	70	60	7
28	10	50	70	75	7
29	10	50	70	40	11
30	10	50	70	48	11
31	10	50	70	60	11
32	10	50	70	75	11
33	10	50	70	40	14
34	10	50	70	48	14
35	10	50	70	60	14
36	10	50	70	75	14

3.Results and Discussion

3.1. K/S and Fastness Values

The K/S values and the results of fastness tests of the viscose samples dyed under various sets of parameters using Novacron Yellow S-3R are shown in Table 3.1.

Table 3.1: K/S values and fastness values of samples dyed using Novacron Yellow S-3R

S.No.	K/S Value	Washing Change	Staining	Rubbing Wet	Dry	Light
1	21.534	4-5	4-5	4-5	5	4 & Above
2	21.635	5	5	5	5	4 & Above
3	21.938	5	5	5	5	4 & Above
4	22.375	5	5	5	5	4 & Above
5	23.142	5	5	5	5	4 & Above
6	21.451	3-4	4	4	4-5	4 & Above
7	22.485	3-4	4	4	4-5	4 & Above
8	22.885	3-4	3-4	4	4	4 & Above
9	22.485	4-5	4-5	5	5	4 & Above
10	23.198	4-5	4-5	5	5	4 & Above
11	23.612	4-5	4-5	4-5	5	4 & Above
12	22.267	5	5	5	5	4 & Above
13	22.567	5	5	5	5	4 & Above
14	22.625	5	5	5	5	4 & Above
15	24.136	5	5	5	5	4 & Above

The results of fastness properties of the samples that have been tested show that as the pH is decreased; there is a decrease in washing and rubbing fastness properties. But with change in electrolyte concentration, there is no significant change in fastness properties.

3.2. Cost Studies

The various costs have been calculated according to the following assumptions:

Dye Cost : Rs. 500/Kg

Salt Cost : Rs. 5/Kg with liquor ratio of 1:5.

Soda Ash Cost : Rs. 23/Kg with liquor ratio of 1:5.

Labour Cost : 100 Kgs/hr/person with average wage of Rs. 25/hr.

Heating Cost : It is a calculation of the cost according to the steam loss during hold time.

The processing cost for the dyed samples due to changes in the parameters is listed in Table 3.2

Table 3.2: Cost of Processing of samples

S.No.	K/S value	Dye Cost(Rs.)	Salt Cost(Rs)	Soda Ash Cost(Rs)	Labour Cost(Rs)	Steam Loss Cost(Rs)	Total Cost(Rs)	% Increase
1	11.583	20.40	1.00	1.27	0.15	0.02	22.83	66.2%
2	12.187	19.39	1.20	1.27	0.15	0.02	22.02	60.3%
3	12.857	18.38	1.50	1.27	0.15	0.02	21.31	55.1%
4	13.367	17.32	1.88	1.27	0.15	0.02	20.63	50.2%
5	9.846	23.99	1.00	0.81	0.15	0.02	25.97	89.0%
6	10.622	22.24	1.20	0.81	0.15	0.02	24.42	77.7%
7	11.216	21.06	1.50	0.81	0.15	0.02	23.54	71.3%
8	11.873	19.90	1.88	0.81	0.15	0.02	22.75	65.6%
9	13.877	17.02	1.00	1.61	0.15	0.02	19.80	44.1%
10	14.063	16.80	1.20	1.61	0.15	0.02	19.78	43.9%
11	14.26	16.57	1.50	1.61	0.15	0.02	19.85	44.4%
12	14.502	16.29	1.88	1.61	0.15	0.02	19.94	45.2%
13	15.296	15.45	1.00	0.81	0.29	0.05	17.59	28.0%
14	16.138	14.64	1.20	0.81	0.29	0.05	16.98	23.6%
15	17.396	13.58	1.50	0.81	0.29	0.05	16.22	18.1%
16	17.962	13.15	1.88	0.81	0.29	0.05	16.17	17.7%
17	17.497	13.50	1.00	1.27	0.29	0.05	16.11	17.2%
18	18.583	12.71	1.20	1.27	0.29	0.05	15.52	12.9%
19	19.174	12.32	1.50	1.27	0.29	0.05	15.42	12.3%
20	21.534	10.97	1.88	1.27	0.29	0.05	14.45	5.2%
21	21.635	10.92	1.00	1.61	0.29	0.05	13.87	0.9%
22	21.938	10.77	1.20	1.61	0.29	0.05	13.92	1.3%
23	22.375	10.56	1.50	1.61	0.29	0.05	14.01	1.9%
24	23.142	10.21	1.88	1.61	0.29	0.05	14.03	2.1%
25	20.221	11.68	1.00	0.81	0.54	0.09	14.12	2.7%
26	21.451	11.01	1.20	0.81	0.54	0.09	13.65	-0.7%
27	22.485	10.51	1.50	0.81	0.54	0.09	13.44	-2.2%
28	22.885	10.32	1.88	0.81	0.54	0.09	13.63	-0.8%
29	20.255	11.66	1.00	1.27	0.54	0.09	14.56	5.9%
30	22.485	10.51	1.20	1.27	0.54	0.09	13.60	-1.0%
31	23.198	10.18	1.50	1.27	0.54	0.09	13.58	-1.2%
32	23.612	10.01	1.88	1.27	0.54	0.09	13.77	0.2%
33	22.267	10.61	1.00	1.61	0.54	0.09	13.85	0.8%
34	22.567	10.47	1.20	1.61	0.54	0.09	13.91	1.2%
35	23.625	10.00	1.50	1.61	0.54	0.09	13.74	0.0%
36	24.136	9.79	1.88	1.61	0.54	0.09	13.90	1.2 %

The calculations shown above give a clear indication of how the processing cost has changed with the change in process parameters. If we consider the cost and quality factor, then the samples which seem viable are sample nos. 21, 22, 32, 34, 35 and 36. However, considering only the cost may not give us the best possible route. In today's competitive situation, the best possible use of all available capacities and machinery is very necessary. If this viewpoint is also taken, the process sequence 2 offers an optimum solution.

Total processing time for sequence 1- 100 minutes
Total processing time for sequence 2- 135 minutes
Total processing time for sequence 3- 195 minutes

The sample no. 21 and 22, offer the combined benefit of cost, quality and capacity utilization.

4. Conclusions

The results obtained conveys that, for the dyeing of viscose rayon by Bi-functional Reactive dye, the optimum salt and soda ash concentration was found to be 48 gpl and 14 gpl respectively with a process sequence consisting of running in the dye solution for 10 minutes followed by salt run for 20 minutes and soda ash run for 40 minutes. This set of parameters has been found to be optimum with regard to the cost of processing, fastness properties and also an additional benefit of enhanced plant capacity utilization.

Also it can be concluded that, as the soda ash content increases, the effect of processing time on shade depth decreases.

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Application of Tamarind Seed Coat in Dyeing of Cotton and Silk using Catechu and Henna

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Abstract
From ancient times natural dyes are known, but they are again gaining increasing importance due to increase in awareness about sustainable environment protection and problems associated with synthetic dyes. Even though the natural dyeing has been advantageous in many ways over synthetic dyes, their limited availability of shades is held as one of the main limitations over synthetic dyes. Mixing of dyes to get desired shades is a common practice in case of synthetic dyes, which is however still not practiced as far as natural dyes are concerned. Although regular mordants like harda and alum are common choice, the newer mordant like Tamarind seed coat has been studied to a limited extent. In the current study, the natural dyeing of cotton and silk was attempted using individual and mixed shades of catechu and henna using tamarind seed coat (TSC) as a natural mordant. The pH sensitivity of these dyes was also screened. The various shades obtained were described in terms of colour values. The wide range of shades thus can be claimed in dyeing the compound shades of natural dyes and the issue of limited availability of shades can be overcome following this approach. This work also suggests another avenue for using Tamarind seed coat as a mordant.

Keywords
Tamarind seed coat, Catechu, Henna, Natural dyeing.

1. Introduction

The characteristics such as value addition, look and desire of the customers need to be taken into consideration while manufacturing coloured textiles. In the past, natural dyes were used until recently when synthetic dyes become readily available. The ready availability without restrictions of shade gamut and better standard operating procedures give dyeing with synthetic dyes reproducibility. However they have limitations in some cases where petrochemicals are required to be used and some toxic mordents too [1-8].

The development of synthetic dyes at the beginning of the twentieth century led to a more complete level of quality and more reproducible techniques of application. As a result, a distinct lowering in the dyestuff costs per kg of dyed goods was achieved [9]. However in last few decades, the use of synthetic dyes is gradually receding due to an increased environmental awareness and harmful effects because of either toxic degraded products or their non-biodegradable nature. In addition to above, some serious health hazards like allergenicity and, carcinogenecity are associated with some of the synthetic dyes. As a result, a ban has been imposed all over the world including European Economic Community (EEC), Germany, USA and India on the use of some synthetic dyes (e.g. azodyes) containing banned amines [10]. Due to increasing awareness of environmental issues and pollution controls, natural dyes are gaining importance as they are obtained from renewable resources and they present no health hazards and some of them sometimes act as health care products too [11].

Natural dyes with few exceptions are non-substantive and hence must be used in conjunction with mordants such as tannins, metallic salts and oils [12]. TamarindusindicaL., commonly known as tamarind tree is one of the most important multipurpose tree species in the Indian sub-continent. It is a large evergreen tree

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with an exceptionally beautiful spreading crown, and is cultivated throughout almost the whole country, except in the Himalayas and western dry regions [13, 14]. The use of fruit pulp has been known for a very long time. Other uses of it are in food, chemical, and pharmaceuticals [15].It was called 'ambli, amli, imli,tamir' in Hindi, meaning the 'Date of India'. India is one of the major producers of tamarind in the world. Many states of the country export tamarind to west Asia, Europe and America where it is used in Worcestershire sauces because of its special flavour. Tamarind is a good source of carbohydrates and protein. Tamarind fruit is also reported to be used as a raw material for the preparation of wine-like beverages [16]. The edible portion of the ripe pod reportedly contains moisture 63.3-68.6%; protein 1.6-3.1%; fat 0.27-0.69%; total sugars 22.0-30.4%; sucrose 0.1-0.8%; cellulose 2.0-3.4% and ash 1.2-1.6%. The dried pulp contains moisture 20.9-21.3%; protein 3.1-5.0%; fat 0.1-0.6%; total carbohydrates 67.4- 70.7%; fibre 5.6-18.3%; tartaric acid 8-18%; invert sugars 30-40%; ash 2.4-2.9% and 270 calories.

The powder, commercially known as tamarind kernel powder (TKP), is found to be extensively used as a sizing material in the textile industry as well as in the food industry [17,18].

The seed coat, a by-product of tamarind gum industries can be used as a safe and low-cost antioxidant for increasing the shelf-life of foods by preventing lipid peroxidation [19-21]. It is used for wound healings and as anti-dysenteric drug. It is also used as a raw material for the preparation of plywood adhesives [22].With a particular astringent taste, the profile of polyphenolics present in the tamarind seed coat was found to be dominated by proanthocyanidins, commonly known as condensed tannins or phlobatannin [23].

Since tannins are very good mordant in dyeing of natural colours, exploring the potential in dyeing of different fabric with natural colours after treating them with tamarind seed coat will be of great interest.

Dyeing with henna is known for long time. Henna has many traditional and commercial uses, the most common being as a dye for hair, skin and fingernails, a dye and preservative for leather and cloth, and as an anti-fungal. In combination with metal salts, it produces a range of colours on wool and silk; camel brown with aluminium, yellow ochre with copper, mustard yellow with chrome and blackish brown with ferrous. The light fastness of dyed fabrics is good [24]. In the present work it is used in mixed shades.

Catechu is a brown dye named as cutch and used for tanning and dyeing and for preserving fishing nets and sails. In this work catechu is another colour being used. It is quite interesting to note that even though natural dyeing is considered to be ecofriendly, the use of metallic mordants which are considered to be toxic, lowers natural dye's ecofriendly advantage.

The self and mixed shades of catechu and henna using alum and hardaas mordants were reported earlier from our laboratory [25, 26]. In continuation of the same work, in the current study the natural dyeing of cotton and silk has been attempted using tamarind seed coat (TSC) as a mordant both in self and compound shades of catechu and henna and the wide range of shades explored have been presented. The potential of use of tamarind seed coat as a mordant is also investigated.

2. Material and Methods

2.1. Materials

Cotton and silk fabrics were supplied by Adiv-the Pure Natural. The cotton fabric was washed using shikakai and reetha at 60^0C and then used for dyeing. Catechu and henna were purchased from market. All other chemicals used were of laboratory grade.

2.2. Methods

2.2.1. Extraction of mordant

The 1% stock solution was made by boiling 2.5 gm of mordant (tamarind seed coat) powder in 250 ml water for 30 min. The extract was filtered and made to 250ml and used for mordanting.

2.2.2. Extraction of dye

The 1% stock solution of the dye was prepared by boiling 2.5 g of dye in 250 ml water for 30 min. The extract was filtered and made to 250ml and used for dyeing.

2.2.3. Mordanting and dyeing of cotton and silk
The modanting of cotton and silk fabric was carried out in rota dyer (Rota Dyer machine, Rossari® Labtech, Mumbai) keeping the liquor to material ratio of 30:1.The fabrics were introduced into the mordant extract solution at room temperature and slowly the temperature was raised to 95^0C. The mordanting was continued at this temperature for 60 min. After mordanting the fabric was squeezed and dyed using natural dyes (catechu and henna). The mordanted fabrics were introduced in dyebath and dyeing was continued at 900C for 60 min. After dyeing, the fabrics were squeezed and washed with cold water.

2.2.4. Compound shades on cotton and silk
In case of compound shades, the fabrics were mordanted using alum as a mordant as per the procedure mentioned in 2.2.3. The mordanted samples were then dyed using combination of two dyes namely catechu and henna taken in proportions 30:70, 50:50, and 70:30 of the total dye extract required for the targeted % shade. The dyeing procedure was same as described in 2.2.3.

2.2.5. Effect of pH on dyeing of Catechu and Henna
In the case of pH sensitivity study of the natural dye, the fabric samples were mordanted using alum as a mordant in the same way as mentioned in 2.2.3. The dyeing was then carried out using same procedure as mentioned in 2.2.3.and using catechu and henna at different pH (4, 7, and 9 adjusted using acetic acid and soda ash).

2.2.6. Colour value by reflectance method
The dyed samples were evaluated for the depth of colour by reflectance method using 10degree observer. The absorbance of the dyed samples was measured on RayscanSpectrascan 5100+ equipped with reflectance accessories. The K/S values were determined using expression;

$$K/S = \frac{(1-R)^2}{2R}$$

where, R is the reflectance at complete opacity; K is the Absorption coefficient & S is the Scattering coefficient.

Dyed fabrics were simultaneously evaluated in terms of CIELAB colour space (L*, a* and b*) values using the RayscanSpectrascan 5100+. In general, the higher the K/S value, the higher the depth of the colour on the fabric. L* corresponding to the brightness (100= white, 0= black), a* to the red-green coordinate (+ve= red, -ve =green) and b* to the yellow-blue coordinate (+ve =yellow, -ve =blue). As a whole, a combination of all these parameters enables one to understand the tonal variations.

2.2.7. Washing fastness
Evaluation of colour fastness to washing was carried out using ISO II methods [27]. A solution containing 5 g/L soap solution was used as the washing liquor. The samples were treated for 45 min at 50 0C using liquor to material ratio of 50:1 in rota machine. After rinsing and drying, the change in colour of the sample and staining on the undyed samples were evaluated on the respective standard scales (rating 1:5; where 1: poor; 2: fair; 3: good; 4: very good and 5: excellent).

2.2.8. Light fastness
Dyed fabric was tested for colourfastness to light according to ISO 105/B02 [28]. The light fastness was determined using artificial illumination with Xenon arc light source, Q-Sun Xenon Testing Chamber with black standard temperature of 65^0C with relative humidity of the air in the testing chamber as 40% and daylight filter, wavelength, k= 420 nm. The samples were compared with the standard scale of blue wool reading (ratings, 1:8; where 1 : poor; 2 : fair; 3 :moderate; 4 : good; 5 : better; 6 : very good; 7 : best and 8 :excellent).The colour fastness to light was measured using standard test method.

3. Results and Discussion

In continuation of the work on mixed shades of natural dyes on natural fibres and use of nonmetallic ecofriendly mordant, the tamarind seed coat tannin was utilized here as a mordant for dyeing of cotton and silk with natural dyes like catechu and henna and the results are presented in Tables 3.1 to 3.7.

The initial attempt was to find the optimum concentration of mordant and dye to study further the effect of mixing of dyes and pH sensitivity of the dye. The results of optimization of mordant and dye concentrations are summarized in Tables 3.1-3.4. The results in Table 3.1 indicate the increase in K/S values with the increasing concentration of mordant till 15% and then it is leveled-off. In other words, TSC was also responsible for dyeing of silk playing the role of a mordant. At the constant mordant concentration, the K/S was also

found to be improving with increase in dye concentration from 5% to 20%. The various shades from light to deep can be obtained using the varying concentration of mordant and natural dyes such as catechu and henna. The colour value in the case of natural dyes is a combined contribution of the effect of mordant and the dye. Hence the K/S was improved with mordant and dye concentration initially till the optimum was reached. The increasing concentration of either mordant or dye beyond optimum concentration did not contribute much in the improvement in K/S values or deepening of the shade.

In the case of silk fabrics, the K/S values were higher than those observed in case of cotton. This might be attributed to the higher mordant and dye absorption by the silk fabric than that of cotton, which in turn was due to presence of -NH2 groups in the silk having more affinity for such mordents and dyes. Since the different results were obtained in case of catechu and henna, the optimum concentration of TSC and dyes were taken as 20% each in case of dyeing of mixed shades.

Table 3.1: Effect of mordant (TSC) and dye (Henna) concentration on colour strength of silk

Mordant	Dye	Colour value	CIE colour co-ordinates		
TSC	Henna	K/S	L*	a*	b*
5%	5%	0.6456	71.795	5.292	9.307
5%	10%	0.9719	73.916	4.999	11.762
5%	15%	1.0041	74.425	4.781	12.011
5%	20%	1.1073	75.256	4.831	13.083
10%	5%	0.8155	72.15	5.622	10.075
10%	10%	0.984	73.861	5.596	11.978
10%	15%	1.3553	74.989	5.268	13.227
10%	20%	1.4522	75.084	5.171	13.288
15%	5%	1.012	72.893	6.223	11.408
15%	10%	1.1522	74.03	6.102	12.589
15%	15%	1.5426	74.819	5.853	13.378
15%	20%	1.5925	75.31	5.645	13.721
20%	5%	1.3624	73.697	6.647	12.59
20%	10%	1.4133	74.149	6.379	12.906
20%	15%	1.6714	74.862	6.214	13.636
20%	20%	1.7432	75.352	5.966	14.09

Table 3.2: Effect of mordant (TSC) and dye (catechu) concentration on colour strength of silk

Mordant	Dye	Colour value	CIE colour co-ordinates		
TSC	Catechu	K/S	L*	a*	b*
5%	5%	1.82	58.229	13.294	16.127
5%	10%	2.0836	58.928	14.14	18.077
5%	15%	3.6058	59.948	17.112	19.876
5%	20%	5.1246	60.462	18.492	20.953
10%	5%	3.2974	59.443	16.412	18.418
10%	10%	3.8998	60.684	17.045	21.454
10%	15%	5.3212	60.409	18.381	20.344
10%	20%	5.4063	60.737	17.901	21.747
15%	5%	2.5261	59.264	13.742	18.397
15%	10%	3.0048	60.272	15.273	20.543
15%	15%	4.3904	61.191	16.989	22.431
15%	20%	5.0786	61.235	17.049	22.477
20%	5%	3.5266	59.962	16.482	19.489
20%	10%	4.0929	60.364	16.135	20.591
20%	15%	6.2466	60.373	20.167	21.209
20%	20%	8.2403	60.649	19.87	20.99

Table 3.3: Effect of mordant (TSC) and dye (henna) concentration on colour strength of cotton

Mordant	Dye	Colour value	CIE colour co-ordinates		
TSC	Henna	K/S	L*	a*	b*
5%	5%	0.9547	68.644	4.002	11.389
5%	10%	1.0881	69.343	3.908	11.993
5%	15%	1.2489	69.146	3.845	11.761
5%	20%	1.3714	69.997	4.076	12.828
10%	5%	1.0901	68.813	4.498	12.104
10%	10%	1.1156	69.365	4.622	12.664
10%	15%	1.3092	69.153	4.239	12.085
10%	20%	1.3316	69.94	4.447	12.971
15%	5%	1.1121	68.925	4.995	12.32
15%	10%	1.2942	69.182	4.529	12.388
15%	15%	1.2551	69.675	4.783	13.098
15%	20%	1.3952	69.972	4.785	13.248
20%	5%	1.1856	69.56	5.288	13.292
20%	10%	1.1183	68.704	5.197	12.373
20%	15%	1.5352	69.967	4.962	13.377
20%	20%	2.6407	71.318	5.588	15.413

Table 3 4: Effect of mordant (TSC) and dye (catechu) concentration on colour strength of cotton

Mordant	Dye	Colour value	CIE colour co-ordinates		
TSC	Catechu	K/S	L*	a*	b*
5%	5%	1.7252	64.889	6.088	17.626
5%	10%	2.0405	60.109	13.752	16.01
5%	15%	2.5041	60.444	14.308	16.814
5%	20%	2.6973	60.292	14.295	16.575
10%	5%	1.7619	60.65	12.663	15.832
10%	10%	2.4787	60.337	14.214	16.498
10%	15%	2.5334	60.496	13.873	16.683
10%	20%	2.9237	60.453	14.273	16.837
15%	5%	1.9646	59.912	13.818	15.627
15%	10%	2.432	60.354	13.73	16.334
15%	15%	2.7758	60.378	13.716	16.627
15%	20%	3.2001	60.706	14.425	17.295
20%	5%	1.9492	61.414	11.58	17.273
20%	10%	2.3855	60.466	12.928	16.132
20%	15%	2.9129	60.491	13.576	16.562
20%	20%	3.2022	60.86	13.619	17.359

The compound shades on cotton and silk using combinations of catechu and henna with TSC as a mordant are summarized in Table 3.5.

Table 3.5: Effect of combination of two dyes (w/w) on colour strength of silk and Cotton

Fabric	Henna	Catechu (%)	K/S	L*	a*	b*
Silk	30%	70%	4.1387	55.676	18.77	23.102
	50%	50%	3.2984	55.994	15.246	23.856
	70%	30%	1.9662	55.392	12.534	22.704
Cotton	30%	70%	4.7181	63.46	12.131	18.751
	50%	50%	2.2122	64.915	10.368	20.29
	70%	30%	2.0134	65.297	9.393	16.035

The results clearly indicate the increase in K/S value as concentration of catechu was increased in the mixture at the cost of henna. However the different tones in the shades were obtained ranging from typical red of henna to brown of catechu. This is because of varied extent of presence of individual henna and catechu dyes in the bath.

The effect of pH on dyeing of cotton and silk with catechu and henna dyes and TSC as mordant (with optimum concentration) was studied and the results are summarized in Table 3.6.

Table 3.6: Effect of pH on colour strength of silk and cotton

Fabric	Dye	pH	K/S	L*	a*	b*
Silk	Henna	4	4.2975	43.75	11.02	120.125
	Henna	7	2.9868	42.777	9.577	18.701
	Henna	9	2.4359	42.225	9.717	17.673
	Catechu	4	7.9154	46.971	19.616	27.21
	Catechu	7	4.4919	41.837	15.69	21.809
	Catechu	9	2.8834	44.082	12.497	20.647
Cotton	Henna	4	1.3846	53.662	7.082	17.851
	Henna	7	1.3062	52.482	8.719	16.224
	Henna	9	1.2288	53.316	5.546	17.445
	Catechu	4	4.9421	52.901	16.072	16.518
	Catechu	7	4.7762	54.426	17.593	19.518
	Catechu	9	2.3472	54.261	15.869	19.283

At different pH conditions different values of K/S were obtained and it was observed that in acidic conditions i.e. at pH 4, higher K/S values were obtained compared to those at pH 7 and pH 9. In another words, the acidic pH was more suitable for dyeing and giving enhanced K/S values. However, looking at the sensitivity of the fiber to acids many a times, neutral pH is normally selected.

The fastness properties of the representative samples were estimated and are presented in Table 3.7.

Table 3.7: Fastness properties of the dyed fabrics

Fabric	Henna (%)	Catechu (%)	Washing Fastness	Rubbing fastness		Light
				Dry	Wet	
Silk	0	100	3-4	4	3	6
	30	70	4	4	3	6
	50	50	4	4	3	6
	70	30	4	4-5	3-4	6
	100	0	4	4-5	3-4	5
Cotton	0	100	3-4	4	3-4	6
	30	70	4	4	3-4	6
	50	50	4	4	3-4	6
	70	30	4	4-5	3-4	6
	100	0	4	4-5	3-4	5

The wash fastness was of the grade "good to very good" (3-4) to very good (4). The rubbing fastness was in the range of "good"(3) to "excellent" (5). The light fastness was also very satisfactory(6). The fastness properties were found to be comparable in the case of both the dyes and their mixtures. These fastness properties were improved with increasing mordant concentrations. The improvement in fastness properties with mordant concentration clearly indicates the positive role of TSC as a mordant played in case of dyeing with natural dyes. Light fastness was also found to be improving with higher K/S values, which in turn was dependant on higher mordant and/or dye concentration.

4. Conclusion

Tamarind seed coat was effective mordant in giving very good compound shades with dyes such as henna and catechu when tested on cotton and silk fibre. Hence the use of TSC as a mordant is quite justified. The results are encouraging as wide range of shade gamut was obtained. Effect of pH on colour depths of different dyes and mordant combination is also studied and encouraging results were obtained giving different shades. This shade gamut can further be widened using different pH. The fastness properties seemed to have remained unchanged even with the use of combination of dyes.

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Development and Investigation of Recycled Fibre Nonwovens for Acoustic Absorbing Materials

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Abstract
An attempt has been made to develop nonwoven materials made out of recycled fibres of cotton, viscose and polyester fabrics collected from garment industries. These nonwoven fabrics are made by adhesive bonding technique and their acoustic behaviours have been tested by impedance tube method (ASTM E 1050) for determining sound absorbing coefficient. The physical properties of these nonwoven materials such as areal density, thickness, bulk density, porosity and air permeability were compared and reported. The nonwoven made up of recycled polyester has better sound absorption coefficient. The mean Sound Absorption Coefficient (SAC) of cotton, viscose and polyester nonwovens lies in between 0.21 to 0.51 when tested under the frequencies of 500 Hz to 6400 Hz. These recycled nonwoven materials may be used as noise absorbents for automotive interiors and wall coverings in building interiors. It may be suggested that the currently used conventional materials like glass wool, rock wool, foam and various manufactured fibres that are hazardous and difficult to recycle can be replaced using these nonwovens.

Keywords
Acoustic absorption, Adhesive bonding, Impedance tube, Recycled fibre nonwoven.

1. Introduction

Noise is a form of air pollution and like other forms of pollution, it affects the quality of life and so it can be thought of as a social cost. Noise absorbing materials like natural fibres, synthetic fibres and their recycled fibres have a role to play in controlling the noise and insulating the noise from transmission. Generally, noise (unpleasant sound) absorbers rely for their action upon the frictional losses which occur when the alternating pressure of the incident wave causes a 'to and fro movement' of the air contained in the pores of the materials. It has been found that the acoustic properties of a porous type of absorbent is determined almost by three factors such as porosity, airflow resistance and thickness of the materials.

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In recent years, the subject of noise control has received an increasing amount of attention in research on the usage of textile materials as sound absorbing products. Properly designed nonwoven fabrics may be used as noise control elements in wide range of applications like wall coverings, acoustic barriers and acoustic ceilings [1]. The efficacy of sound absorption depends on the frequency of the sound wave to which the material is exposed, areal density and air permeability of substrate and construction of the material etc. With the increase in frequency, areal density and distance from the source, the extent of sound reduction increases, while with the increase in air permeability, the extent of sound reduction by the material decreases [2]. Acoustical sustainable materials, either natural or made from recycled materials are quite often a valid alternative to traditional synthetic materials; the air borne sound insulation of natural materials such as flax or recycled cellulosic fibres is similar to one of rock or glass wool. The industrial tea leaf waste material (waste produced during the processing of tea leaves) which is natural,

renewable and not harmful to human health, exhibits a better sound absorption, when compared with polyester and polypropylene based nonwovens, with various thickness in the frequency ranges of 500 - 3200 Hz and 500 - 2400 Hz [3]. The coir fibre treated with latex in compressed sheet form with density of 74 g/m3 shows average noise absorption coefficient of 0.50. Similarly the oil palm fibre treated with polyvinyl alcohol in compressed sheet form with density 130 g/m3 shows average noise absorption coefficient of 0.64 [4].

Nonwovens are ideal materials for acoustical insulation because they have high total surface. The surface area is directly related to denier and cross-sectional shape of the fibres in the fabric. Smaller diameter yields more fibres per unit weight of the material. Higher total surface area has greater possibilities of sound wave to interact with the fibres in the structure [5]. The acoustic absorption profiles of nonwoven made up of valour fibres, when in low thickness, possess excellent performance in sound absorption of high frequency, especially above 2000 Hz. The sound absorption of the systems at the medium and the low frequency can be improved by increasing the thickness, making them suitable for automobile sound proofing systems [6]. The influencing factors to make up a fibre assembly to increase the absorption coefficient are, to increase the thickness than to reduce its porosity [7]. The sound absorption performance of the porous materials used in automobile is not so much of functional type of material like Cotton, polyester or Glass Fibre, as it is a function of how well the material is constructed to achieve the required properties [8]. The noise absorption coefficient of fibre content usually depends on the content of the fine fibres. The nonwoven which have more fine fibres have more chance to contact the sound wave. This will cause more resistance by means of friction of viscosity of the vibration of the air. The nonwoven with the poor oriented web has a high noise absorption coefficient than a well oriented web [9].

The nonwoven as floor covering, using natural fibre (Kenaf, jute, waste cotton and flax) blended with polypropylene and polyester contributed noise absorption coefficient of 0.5 to 0.81 at 3.2 KHz. The soft cotton under pad greatly enhances the sound absorption properties of the nonwoven floor coverings [10, 11]. The sound absorption properties of materials are important not only for noise reduction but also for controlling the reverberation time for speech intelligibility in rooms and promoting fuller sound in concert halls.

The present investigation deals with the development of nonwoven products using recycled fibres from waste, generated in garment industry, for the application in automobile and building interiors.

2. Materials and methods

2.1 Materials

The cutting waste from the garment industry is collected separately as cotton, viscose and polyester fabrics. The waste fabrics are cut into small pieces by means of fabric cutting machine and opened into fibres by fabric opener. The materials are shown in Figure 2.1.

(a)

(b)

(c)

Figure 2.1: (a) Waste from garment industries. (b) Cut pieces of fabrics (c) Opened fibres.

2.2 Methods

The garment unit wastes are converted in to nonwoven as shown in Figure 2.2. The cutting wastes are cut into small pieces of cloth by fabric cutting machine. The chopped pieces of waste are fed in to the fabric opener where they are opened as yarn bits as shown in Figure 2.3. By processing twice in the hard waste opener, the yarn tufts are opened further to get fibrous stage.

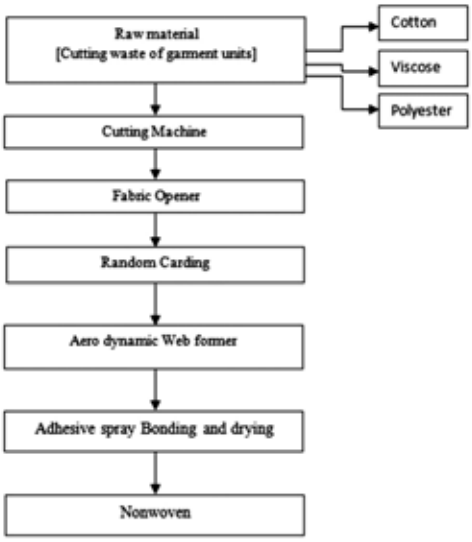

Figure 2.2 : Method of developing the nonwoven

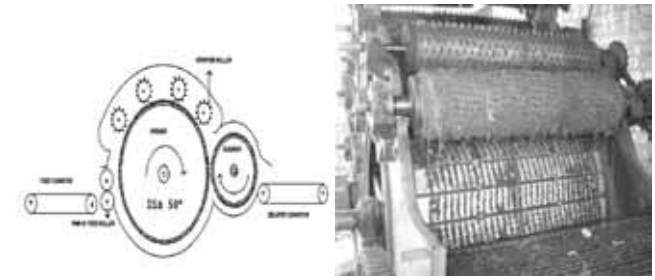

Figure 2.3 : Fabric opener

The fibrous materials are deposited over the circumference of the condensing cages to get continuous fibrous web as in Figure 2.4 by the aerodynamic principle of web formation. The fibrous layer from the web former is sprayed with adhesive to get adhesive bonded nonwoven fabric as shown in Figure 2.5.

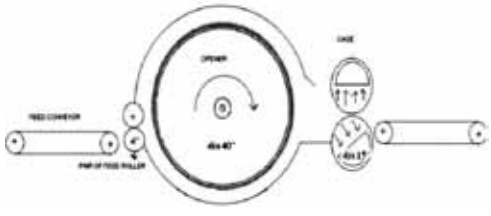

Figure 2.4: Web former.

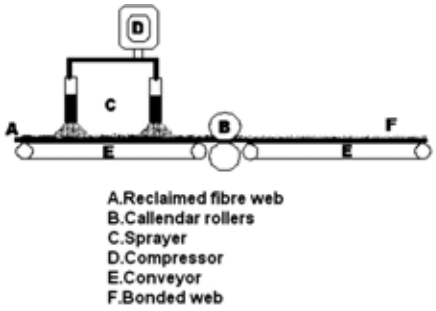

Figure 2.5: Chemical bonding

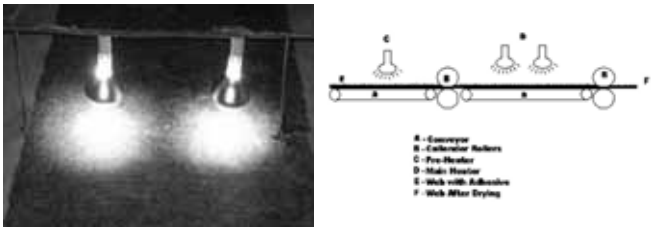

Figure 2.6 : Drying

Care has been taken to bond by adhesive (Poly Vinyl Alcohol with Viscosity of 5.0 - 6.0 mpa.s , pH value of 5-7 and Specific Gravity 1.30) with 20% add on weight. The sprayed sheets are calendared and dried through a drying chamber to get the nonwoven fabric as shown in Figure 2.6.The developed samples are shown in Figure 2.7.

(a)

(b)

(c)

Figure 2.7: Developed nonwovens (a) Cotton (b) Viscose (c) Polyester

2.2.1 Testing methods

The sound absorption coefficients of the nonwovens were tested by the impedance tube method based on ASTM E 1050 at Marmara University, Turkey. The Sound absorbing function of the nonwovens is to reduce the noise. A sound source (loud speaker) is mounted at one end of the impedance tube and at the other end the nonwoven is placed as shown in the Figure 2.8. The loud speaker generates broadband, stationary random sound. This sound propagates as planner waves in the tube, hits the sample and gets reflected. Thus, a standing wave interference pattern results due to superimposition of forward and backward travelling waves inside the tube. The sound pressures at two fixed locations are measured and by using the two-channel digital frequency analyser, it is possible to determine the complex reflection coefficient, the sound absorption coefficient and the normal acoustic impedance of the nonwoven.

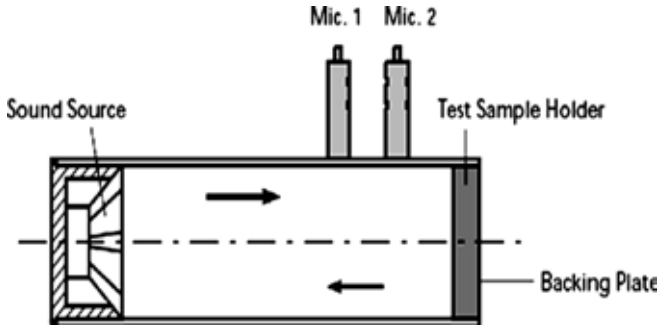

Figure 2.8 : Impedance tube setup for two microphone transfer function method

The usable frequency range depends on the diameter of the tube and spacing between the microphone positions. The small tube setup with 29mm diameter measures the parameters of sound in the frequency range from 500Hz to 6.4 KHz. Whereas, the larger tube setup with100 mm diameter measures the parameters of sound in the frequency range from 50Hz to 1.6 KHz.

2.2.2 Sound absorption co-efficient

For Acoustic absorbing interiors in auditoriums, recording theatres, lecture halls and automobiles, sound absorption coefficient is an important factor and hence, the nonwovens produced from recycled fibres of cotton, viscose and polyester waste fabrics were tested for sound absorption. Sound absorption coefficient resulting from large tube setup for the nonwovens are shown in Table 2.1 and Figures 3.1, 3.2 and 3.3. From Table 2.2, it is observed that the sound absorption coefficient of recycled polyester nonwoven is always higher than that of viscose and cotton in the frequency levels of 0 Hz to 6400 Hz. From low frequency to higher frequency, all the three recycled fibres showed good results. The mean sound absorption coefficient 0.21 to 0.51 is observed at the frequency levels of 50 Hz to 6400 Hz, increase in absorption is observed when increasing the thickness of the nonwovens and backing with cotton woven cloth.

2.2.3 Physical properties

The standard test procedure followed for determining the physical properties of the nonwoven samples are: ASTM D 5736 for thickness of the fabric, ASTM D 6242 for areal density in grams per square meter; ASTM D 737 for its air permeability.

Textsmile

Two factory workers are talking.
The woman says, "I can make the boss give me the day off."
The man replies, "And how would you do that?"
The woman says, "Just wait and see." She then hangs upside-down from the ceiling.
The boss comes in and says, "What are you doing?"
The woman replies, "I'm a light bulb."
The boss then says, "You've been working so much that you've gone crazy. I think you need to take the day off."
The man starts to follow her and the boss says, "Where are you going?"
The man says, "I'm going home, too. I can't work in the dark."

Table 2.1: Physical properties of the nonwovens

Sample No.	Fibre	No. of layers g/m2	Areal density g/cm3	Bulk density cc/cm2/s	Air permeability	Porosity	Mean SAC	Mean SAC (with backing cloth)
C1	Cotton	1	330.50	0.157	98.01	0.897	0.25	0.31
C2	Cotton	2	653.00	0.167	69.28	0.891	0.33	0.49
C3	Cotton	3	980.77	0.178	37.18	0.884	0.48	0.51
V1	Viscose	1	323.11	0.155	106.81	0.898	0.21	0.32
V2	Viscose	2	648.01	0.162	81.03	0.893	0.31	0.53
V3	Viscose	3	960.21	0.169	39.72	0.888	0.47	0.55
P1	Polyester	1	321.19	0.139	91.08	0.899	0.30	0.34
P2	Polyester	2	639.00	0.144	56.14	0.895	0.41	0.68
P3	Polyester	3	948.03	0.149	34.51	0.892	0.51	0.63

3. Results and discussions

3.1 Effect of fibre type on sound absorption

Different recycled fibres of natural and synthetic fibres have different properties especially in consideration of rigidity, elongation, surface properties and resiliency. These properties influence the density of the nonwovens, which in turn affect the sound absorption by the fabric.

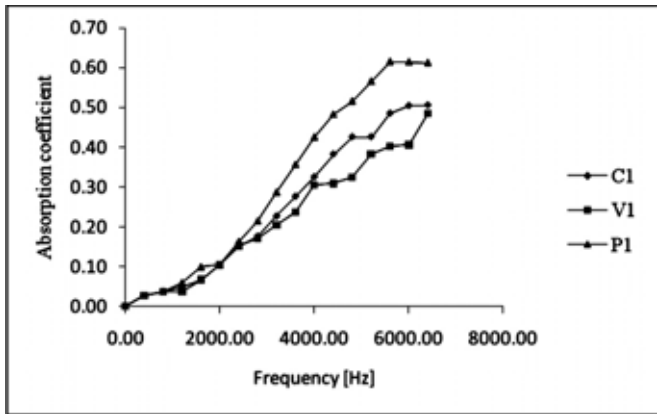

Figure 3.1: Sound absorption coefficient of single layer nonwovens of Cotton (C1), Viscose (V1) and Polyester (P1).

The Figure 3.1 shows the sound absorption coefficients of recycled fibre adhesive bonded nonwoven made out of cotton, viscose and polyester. The evaluation has been done with the single layer, double layer, triple layer and backing with woven cotton fabric of all samples of cotton, viscose and polyester. It can be observed that, because of compactness and intimate blends of fibres, which is due to easy bonding of short fibre contents with adhesives, that recycled viscose gives the lowest average sound absorption coefficient (SAC) 0.21for V1, 0.31 for V2 and 0.47 for V3 among all the samples tested.

Recycled cotton fibre nonwoven shows the average SAC of 0.25(C1), 0.33(C2) and 0.48(C3) higher than the viscose. This is due to fine cotton (recycled fibre) with a more compact fabric structure. Polyester being synthetic fibre, while recycling, is comparatively less ruptured than viscose and cotton and shows the average SAC of 0.30 (P1), 0.34 (P2) and 0.51(P3) higher than both the fibres. The recycled fibre nonwoven exhibits higher efficiency of sound absorption due to the following factors

- Effect of fibre diameter.
- Shortened length of fibres.
- Variable pore geometry of the fabric.

3.2 Effect of number of layers on sound absorption

Nonwoven fabrics of recycled fibres, while increasing in the number of layers, the sound absorption coefficient also increases; the Figures 3.1, 3.2 and 3.3 show the SAC values of single, double and triple layers of nonwovens. The cotton with single layer having areal density of 330.50 g/m^2 shows the mean SAC value of 0.25, the double layer nonwoven of cotton exhibits 24% increase in mean SAC and the triple layer exhibits 47% increase in the mean SAC. Recycled viscose nonwoven single layer with areal density of 323.11 g/m2 exhibits mean SAC of 0.21, double layer exhibits 32% of increase in the mean SAC and triple layer exhibits 55%

of increase in SAC. Recycled polyester nonwoven with areal density of 321.19 g/m^2 exhibits mean SAC of 30%, double layer exhibits 11% increase in the mean SAC and triple layer exhibits 47% of increase in mean SAC.

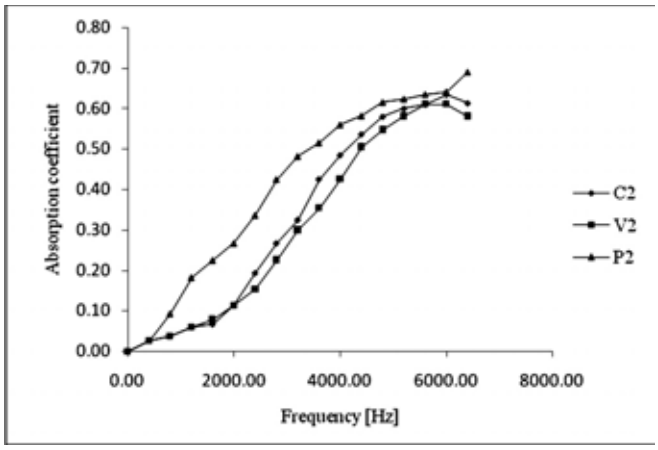

Figure 3.2 : Sound absorption coefficient of double layer nonwovens of Cotton (C2), Viscose (V2) and Polyester (P2).

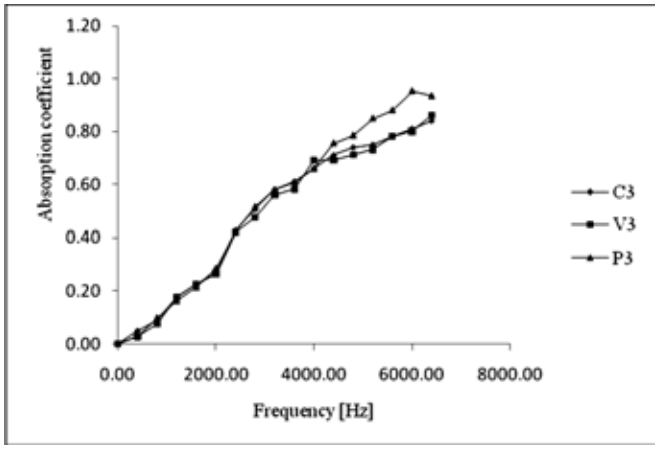

Figure 3.3: Sound absorption coefficient of triple layer nonwovens of Cotton (C3), Viscose (V3) and Polyester (P3).

3.3 Effect of areal density on Sound absorption coefficient of the nonwoven

The Figure 3.4 shows, when there is an increase in areal density there is an increase in sound absorption coefficient for cotton, viscose and polyester nonwovens. Hence, there may be correlation between these two parameters for all nonwovens. The cotton, viscose and polyester shows good correlation having R^2 value of 0.97, 0.9826 and 0.9992 with the equations Y =0.115X +0.1223, Y=0.13X+0.07and Y=0.105X+0.1967.

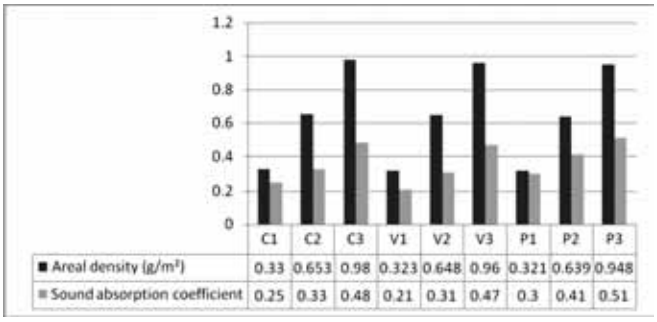

Figure 3.4 : Effect of areal density on Sound absorption coefficient of the nonwovens

3.4 Effect of bulk density on Sound absorption coefficient of the nonwovens

The influence of bulk density on SAC of nonwovens as shown in Figure 3.5 reveals that the increase in bulk density directly increases the SAC. Double layered cotton nonwoven having the difference in bulk density of 0.01g/cm^3 with the single layered cotton nonwoven depicts 24% increase in SAC. Triple layered cotton nonwoven having the difference in bulk density of 0.021 g/cm3 depicts 47% increase in mean SAC. Double layered viscose nonwoven having the difference in bulk density of 0.007 g/cm^3 with single layer depicts 32% increase in mean SAC. Triple layered with difference of bulk density 0.014 shows 55% increase in mean SAC. Polyester double layered nonwoven having the difference of bulk density 0.005 g/cm^3 with single layer depicts increase in mean SAC of 26% and triple layer with difference of bulk density 0 .01 g/cm^3 depicts 47% of increase in mean SAC.

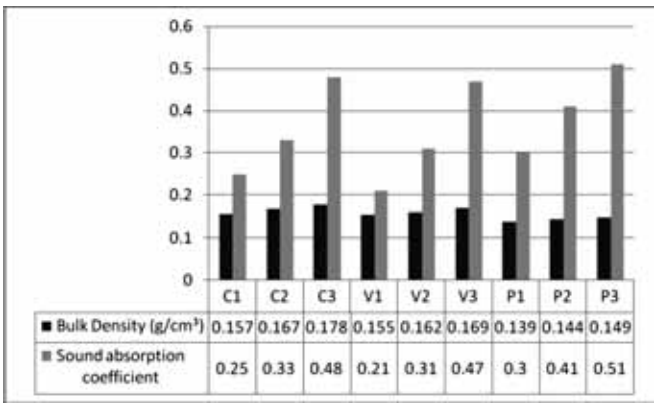

Figure 3.5. Effect of bulk density on Sound absorption coefficient of the nonwovens.

3.5 Effect of air permeability on Sound absorption percentage of the nonwovens

The adhesive bonded nonwoven fabrics of recycled cotton, viscose and polyester fabrics while increasing

the number of layers, decreases air permeability as in Figure 3.6. As the number of layers increases, it not only increases the areal density and bulk density of the combined samples, but also increases the short fibre content which will occupy the air voids. The Figure 3.7 shows a good correlation having R^2 value of 0.9783 with the equation Y= - 0.0038X +0.6205, it is a significant negative correlation between sound absorption and air permeability.

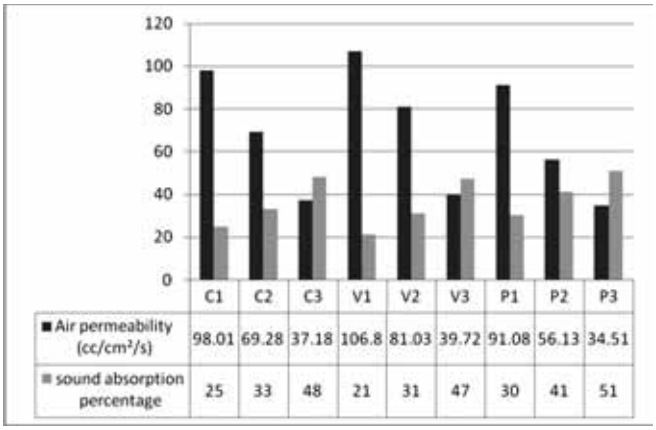

Figure 3.6 : Effect of air permeability on sound absorption percentage of the nonwovens.

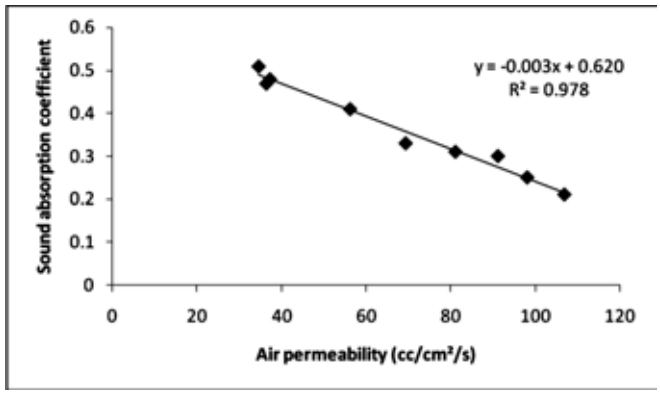

Figure 3.7 : Correlation between Sound absorption and air permeability of the nonwovens.

3.6 Effect of porosity on Sound absorption coefficient of the nonwovens

Similar to air permeability, lower the level of porosity higher the level of sound absorption, Figure 3.8 shows the influence of porosity on sound absorption. Less porosity and less air permeability of the samples permit the sound frequency lesser amount at low frequency level, but at higher frequency the sound enters into the fine pores and experiences friction between the fibres and adhesives; thus, higher absorption of sound energy.

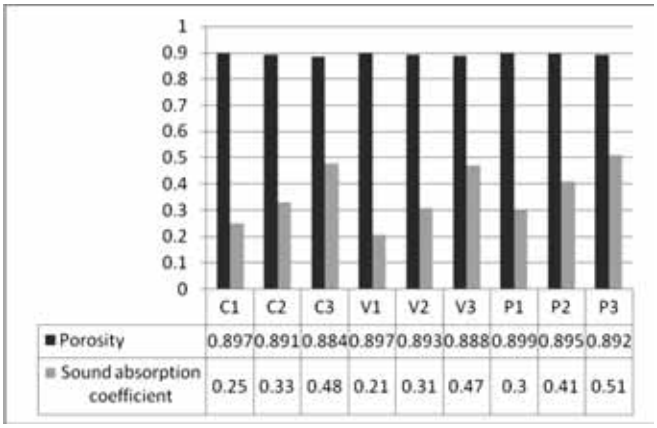

Figure 3.8 : Effect of porosity on Sound absorption coefficient of the nonwovens.

3.7 Effect of woven backing cloth on Sound absorption coefficient of the nonwovens

The nonwovens of cotton, viscose and polyester single layer(C1B,V1B & P1B), double layer (C2B,V2B & P2B) and triple layer (C3B,V3B & P3B) backing with a woven plain fabric of 20s warp and 20s weft, while tested for sound absorption, shows the results as shown in Figure 3.9. The double layer polyester nonwoven depicts the highest SAC of 1, but the nonwoven with three layers of cotton, viscose and polyester backing with woven cloth shows insignificant values i.e. $R^2 <$ 0.9. This is because, though the thickness is more, the backing cloth reduces the absorbing performance. The Figure 3.10 shows the SAC values of multi layers of cotton woven fabric of 20sx20s, in which the six layers of woven cloth performing with highest SAC value of 0.69.

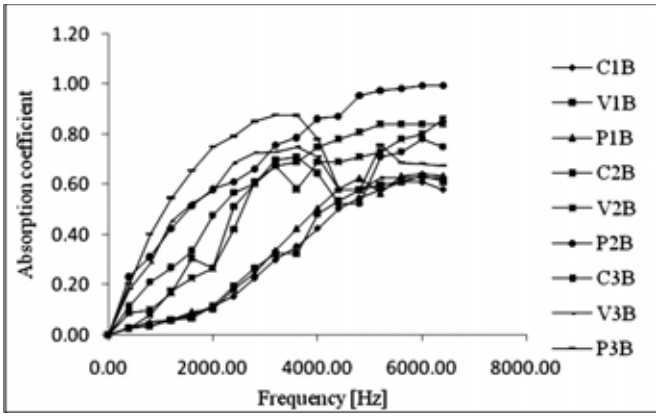

Figure 3.9 : Sound absorption performance of nonwovens made up of recycled cotton,viscose and polyester backing with cotton woven fabric.

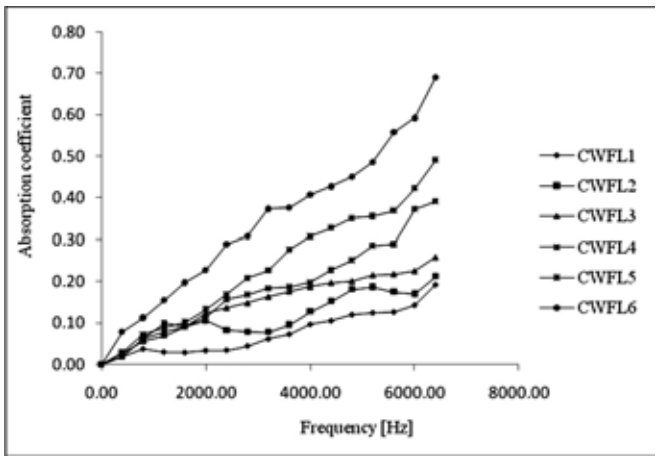

Figure 3.10 : Sound absorption performance of multilayered cotton woven fabric. (CWFLI to CWFL6 - cotton woven fabric layers one to six)

3.8 Multi variable ANOVA analysis

The sound absorption values of the nonwovens made up of recycled cotton, viscose and polyester with different thickness was analysed using statistical tool of multivariable ANOVA analysis and their values are given in Table 3.1. From the results, it is observed that there are significant differences found between the samples of cotton, viscose and polyester at 95 % confidence level shows Factual >Fcritical (130.2105 > 6.944272). It is due to the different structural properties of the recycled fibres. Likewise, the other fabric properties like aerial density, bulk density, air permeability and porosity were analysed and it was found that there are significant differences between the samples because of the types of the fibres (natural, regenerated and synthetic).

Table 3.1 : Multivariable ANOVA analysis

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Anova:TwoFactorWithoutReplication (Aerial density)						
Between samples	610714.6	2	305357.3	7283.095	7.54E-08	6.944272
Within samples	528.9687	2	264.4843	6.308231	0.057949	6.944272
Error	167.7074	4	41.92686			
Total	611411.3	8				
Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Anova:TwoFactorWithoutReplication (Sound absorption coefficient)						
Between samples	0.082467	2	0.041233	130.2105	0.000229	6.944272
Within samples	0.009267	2	0.004633	14.63158	0.014461	6.944272
Error	0.001267	4	0.000317			
Total	0.093	8				
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Anova:TwoFactorWithoutReplication (Bulk density)						
Between samples	0.000338	2	0.000169	21.7	0.007121	6.944272
Within samples	0.000897	2	0.000448	57.65714	0.001124	6.944272
Error	3.11E-05	4	7.78E-06			
Total	0.001266	8				
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Anova:TwoFactorWithoutReplication (Porosity)						
Between samples	0.000156	2	7.8E-05	26.36486	0.004972	6.944272
Within samples	2.91E-05	2	1.46E-05	4.918919	0.083557	6.944272
Error	1.18E-05	4	2.96E-06			
Total	0.000197	8				
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Anova:TwoFactorWithoutReplication (Air permeability)						
Between samples	5674.447	2	2837.223	115.8619	0.000288	6.944272
Within samples	350.2265	2	175.1132	7.150988	0.047767	6.944272
Error	97.95191	4	24.48798			
Total	6122.625	8				

4. Conclusions

The recycled fibre nonwovens as acoustic absorbing materials were developed by using the fibres recycled from the waste fabrics of cotton, viscose and polyester collected from the garment industries. The nonwovens were tested for acoustic absorption by ASTM E 1050. It is observed that polyester fibre nonwoven has the highest absorption coefficient in lowest frequency levels and highest frequency levels. Hence, it is concluded that the nonwoven made of polyester with its closer structure and higher sound absorbing coefficient (0.93) is much suited for interiors in buildings and automotive. The cotton and viscose nonwovens are also having sound absorption of 84% and 86% at 6400Hz. The major applications of these developed nonwoven products may be suggested to use for floor coverings and wall coverings in auditorium.

From this research work the following conclusions are derived:

- The recycled fibre nonwoven exhibits higher efficiency of sound absorption due to the following factors such as Effect of fibre diameter, Shortened length of fibres, Variable pore geometry of the fabric etc.
- Nonwoven fabrics of recycled fibres while increasing the number of layers, also increases the sound absorption coefficient.
- When there is an increase in areal density there is an increase in sound absorption.
- The influence of bulk density on SAC of nonwovens reveals that the increase in bulk density directly increases the SAC.
- There is a significant negative correlation between sound absorption and air permeability.
- While air permeability and porosity are at lower levels, the sound absorption will be at higher level.
- The double layer polyester nonwoven backing with woven cotton fabric nonwoven depicts the highest SAC of 1, but the nonwoven with three layers of cotton, viscose and polyester backing with woven cloth shows insignificant values i.e. $R^2 < 0.9$.

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Texttreasure

No road is too long for him who advances slowly and does not hurry, and no attainment is beyond his reach who equips himself with patience to achieve it.

- Jean de La Bruyère

Environmental Concerns In Textile Processing

C.N.Sivaramakrishnan is a Bsc Tech in Textile chemistry & Fellow- Chartered Colourist (UK) and has over 30 years experience in the Textile wet processing and Specialty chemical manufacturing industries. He has an extensive work experience in process houses and mills across India. He has grass root knowledge of Textile chemistry and its applications to wet processing of Textiles, besides Surfactants, Specialty chemicals, and Effluent treatment chemicals, Pulp & paper chemicals, Industrial gums and other polymers. Participated in an essay competition conducted by Sandoz India Limited and got second prize for the paper - Problems and solutions in the dyeing of polyester and its blends and was awarded cash price. One of the major achievements in the early 90s was the setting up of a modern Ethoxylation plant. He has worked with the Textiles Committee {Govt of India} as Consultant for the cluster development programme initiative and has conducted many training programmes across the country. He is a visiting faculty at various education institutes for Graduate, Master and Post Graduate students and has been an examiner at Institute of Chemical Technology, MANTRA, and NIMMS. He has presented papers at various national and international conferences. Awarded a Bronze medal by the Society of Dyers and Colourist UK for enthusiastic services in the development of SDC Education charity in India. He has authored a book ANTHOLOGY OF SPECIALTY CHEMICALS FOR TEXTILES which was released at the Global conference of the Society of Dyers and Colourist in Goa. He is the founder Trustee of SDC Education Charity and served in various capacities before retiring as Chairman of Board of Trustees. C.N.Sivaramakrishnan was selected Pidilite Industries Limited visiting Fellow for the year 2011 - 2012. He is a prolific writer in many national and international journals of repute on current issues related to chemical technology and Eco textiles. He is currently working on Environmental solutions for Textile industry. He is a Life Member of Textile Association (India) and Association of Chemical Technologists (India).

Textile industry and Chemical industry have been linked together since the beginning of industrial revolution and without chemical industry there would be no modern textile industry. Textile industry has played an important role in the development of human civilization over several millennia. Coal, iron/steel and cotton were the principal materials upon which the industrial revolution was based. Technical developments from the second part of eighteenth century onwards lead to exponential growth of cotton output in the UK and later to Germany and Asian countries. The production of synthetic fibers started at the beginning of the twentieth century increased exponential growth of the textile sector. It is estimated that over 6000 unique compounds are used in the production of textile and apparel products. Textile manufacturing is one of the world's oldest and most mature industries. Worldwide, textile production and consumption have followed a longterm growth rate of about 2–3% per year, the recent economic recession notwithstanding. The most significant growth has occurred in the developing countries and that pattern is likely to continue in the foreseeable future.

Environmental and Health Impacts

Most information sources on textiles focus on the environmental impacts related to the production and processing of textiles, and/or possible health impacts related to the use of the products themselves. In many cases these two impact areas overlap as they derive from the use of chemicals and other substances which may have both environmental and health impacts. A great variety of material types are used in textiles, some naturally grown, and some synthetically produced. Both the production/cultivation and then the processing of such materials are highly varied and consequently have a variety of impacts. As with foodstuffs, for naturally grown fibers such as cotton, the use of pesticides and fertilizers (organic or nonorganic production) is of particular importance from an environmental perspective, however the processing and "finishing" of products is also significant. For synthetic fibers concerns relate to both the chemicals used to manufacture the products as well as processing and finishing. In the 1960s, while the chemical industry was experiencing enormous growth, it was already becoming clear that there were serious issues with regard to the safety of certain chemicals. Concern was steadily growing about their widespread distribution and the fact that their presence in the environment could be provoking profound health and environmental problems.

Ecology and Textiles

In the last two decades, textile processing has become increasingly concerned to achieve and demonstrate sound environmental performance by controlling the effect of their activities, products and processes taking into consideration its environmental policies and objectives. Textile industry plays a major

role in this Eco awareness programme.

Textile ecology can be broadly classified in three main categories

- Ecology of processing
- Ecology in the waste
- Human ecology

It is expected of textile industry, particularly the processing sector, to strictly adhere to the ecological restrictions from the cultivation of crop to finished product which includes waste management techniques. The awareness of the environmental damage caused by textile production has provoked a different response from the textile industry. Textile processing sectors are facing challenging conditions in the field of quality and productivity, due to globalization of the world market. The guidelines for the textile processing industries by the pollution control boards create concern over the environment-friendliness of the processes. This in turn makes it essential for innovations and changes in the processes. Biotechnology is one such field that is changing the conventional processing to eco friendly processing of the textiles.

Expectations of Ecological textiles are;

- Processed with less damaging inputs.
- Processing units with good sewage treatment.
- Fabrics of good quality and long lasting.

Ecologically grown fibers

What is Ecology? Ecology is the study of how living things and their environment interact with each other and is derived from Greek word Oikos which means house hold and Logos the study of environment. Industrial ecology views industrial system as an artificial system, with primary sources of raw materials and energy and with a number of enterprises making use of what would otherwise be waste products of other members of the system practiced in a manner that minimizes environmental impact while optimizing utilization of resources, energy and capital.

In exhaust dyeing unfixed dyestuffs remain in the bath and load the waste water depending on the dyestuff type and process conditions.

Average degrees of fixation of dyestuffs in exhaust dyeing are summarized

Dyestuff type	Degree of fixation %
Reactive	55 to 97
Vat	75 to 95
Disperse	88to 99
Direct	64 to 96
Acid	85 to 98
Metal Complex	82 to 98
Sulphur	60 to 95
Basic	96 to 100
Chrome	95 to 98
Pigment	100%

[Schulze-Rettmer, 1996]

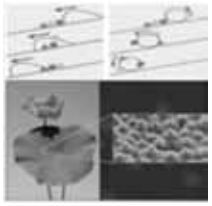
Wastewater from dye bathes or rinsing bathes (resp. residual liquors if padding technologies are used) are loaded with the non exhausted dyes, dyeing auxiliaries, salts, alkali and acids. It has to be taken into account that a dye-formulation contains approx. 30-60% pure dyestuff (rough estimation); the major part of the formulation consists – depending on dyestuff class and application field - of non biodegradable dispersing agents (e.g. naphthalenesulfonic acid formaldehyde

Condensation products or lignin sulfonates), standardizing agents (salts) andadditives (anti-freeze agents etc.)

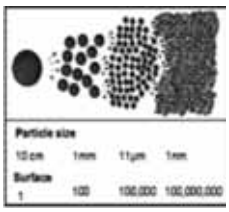
An overview on the main ecological loads concerning the important dyestuff classes is given (multipurpose dyeing auxiliaries used for all the dyeing techniques are not mentioned).

Dyestuff class	Ecological Impact
Reactive	Partially low fixation degree, AOX source, low adsorption tendency of dyestuff hydrolysates in activated sludge treatment, high amount of salts (sodium chloride, sodium sulfate)
Vat	Reducing agents (sulfur compounds), partially halogen containing oxidizing agents
Disperse	Carriers, reductive after treatment (sulfur compounds)
Direct	Salt, after treatment with water toxic cationic agents
Metal complex	Heavy metal content in dyestuffs
Sulfur	Sulfur containing dyestuffs and reducing agents, partially halogen containing oxidizing agent
Basic	Retarder in dyeing PAC (quaternary ammonium compounds)
Chrome	Chrome

Sustainable strategies can give significant environmental benefits like reduction up to 35 to 40% in total energy use, 12 to 15% in water consumption, 65 to 70% in electricity consumption and 35 to 38% carbon- dioxide emissions.



Nanotechnology Based Finishing : The Expanding Field in Textiles

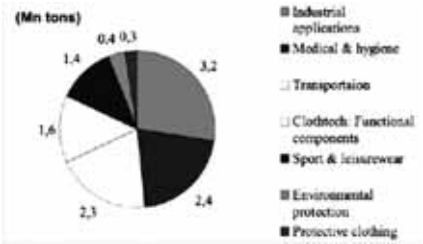


World wide there is increase in demand for improved or even new properties of textiles, especially technical textile as high performance products. Nano-science and nanotechnology combined, have revitalized material science. Nanotechnology is an emerging interdisciplinary area that is expected to have wide ranging implications in all fields of science and technology such as material science, mechanics, electronics, optics, medicine, aerospace, plastics and textiles.

The word "Nano" in Nanotechnology stands for one billionth of a meter i.e. (1nm = 10-9 m). "Nano" is the Greek word for "dwarf" and approximately 10,000 times finer than a human hair. The concept of nanotechnology is not new. The self-cleaning properties of Lotus leaf, which are due to its carefully designed nanostructured surface and tooth and bone, the natural nano biocomposites are being excellent examples of Nanotechnology already existing in nature. There has been a clear shift to nanomaterials as a new tool to improve properties and gain multi functionalities.

The first generation of Nanotechnology was during the beginning of year 2000 and includes passive nanostructures, illustrated by nanostructured coatings, dispersion of nanoparticles, nanocomposites, and nanostructures made of metals, polymers, ceramics, bio-building blocks. Some examples were in the case of sunscreen zinc oxide or titanium dioxide, carbon nanotubes in the case of golf balls etc. Second Generation was the beginning of year 2005 which included active nanostructures, illustrated by transistors, amplifiers, targeted drugs and chemicals, biological and non-biological sensors, actuators, and adaptive structures. The third generation started at the beginning of year 2010 and includes three-dimensional nanosystems and nanosystems using various synthesis and assembly techniques such as bio-assembly, networking at the nanoscale, and multiscale architectures. The fourth generation is to begin in the year 2015 and will include materials by design and heterogeneous molecular nanosystems, where each molecule in the nanosystem has a specific structure and plays a different role. Molecules will be used as devices, and from their engineered structures and architectures will emerge fundamentally new functions.

The production of nanotechnology based textile products is illustrated in the figure below.



Production of Nanotechnology based Textile Products in 2010

Application of Nanotechnology in textiles

◆ ***Water and Oil Repellent (hydrophobic) Nanofinishes***

Many plants in nature exhibit unusual wetting characteristic of super hydrophobicity example, the Lotus leaf. A super hydrophobic surface is the one that can bead off water droplets completely. Super hydrophobic silica coating film which are transparent and durable have been developed on cotton substrates. This nanocomposite coating has new applications in daily use material and plastics or textiles and is an ecofriendly substitute for fluorocarbon based water repellant finish. The air permeability of the fabric remains unchanged and the washing durability of the coatings is also good.

◆ ***Self Cleaning Surfaces***

There are basically two types of self-cleaning surfaces. In the first place there are extremely water repellent rough surfaces on to which dirt particles can hardly get a hold on them and are, therefore, removed by rain or by a simple rinse in water.

The second example is given by photo-catalytic layers such as a layer of titanium oxide, the coating of which results in destruction of organic material by solar irradiation.

◆ ***Hydrophilic Nano Finishes***

It is well known that Polyester and polyamides have poor moisture absorption property which limits its applications in the apparel sector. A

special treatment has been developed which gives durable cellulose wrapping over synthetic fibers such as polyester and polyamides as core. In this, a cellulosic sheath and synthetic core together form a concentric structure to bring overall solutions to the drawbacks of synthetics such as static discharge, harsh handle and glaring luster.

◆ ***Antibacterial Nanofinishes***
Metallic ions and metallic compounds display a certain degree of sterilizing effect. Hence, for imparting anti-bacterial properties, nano-sized silver, titanium dioxide and zinc oxide are used. It is assumed that part of the oxygen in the air or water is turned into active oxygen by means of catalysis with the metallic ion, thereby dissolving the organic substance to create a sterilising effect. With the use of nano-sized particles, the number of particles per unit area is increased, and thus anti-bacterial effects can be maximised.

◆ ***UV Protective Nanofinishes***
Various Semiconductor oxides like TiO2, ZnO, SiO2 and Al2O3 are known to have UV blocking property. It is also known that nanosized TiO2 and ZnO particles are more efficient at absorbing and scattering UV radiation as have much larger surface area to volume ratio than the conventional size particles. A lot of efforts have been made on the application UV blocking treatment to fabrics using nanotechnology.

◆ ***Antistatic Nanofinishes***
Synthetic fibers such as Nylon and polyester are prone to static charge accumulation due to less absorption of water. It has been observed that nanosized TiO2, ZnO whiskers, nano antimony-doped tin oxide (ATO) and silane nanosol could impart antistatic properties to synthetic fibers. TiO2, ZnO nanoparticles are electrically conductive materials and help dissipate the static charge in these fibers.

◆ ***Wrinkle Resistance***
Resin is commonly used in conventional methods to impart wrinkle resistance to fabric. However, there are limitations of using resin, including a decrease in the tensile strength of fibre, abrasion resistance, water absorbency and dyeability, as well as breathability. To overcome these limitations, research has been carried out on nano-titanium dioxide and nano-silica to improve the wrinkle resistance of cotton and silk respectively. Nano-titanium dioxide can be used with carboxylic acid as a catalyst under UV irradiation to catalyse the cross-linking reaction between the cellulose molecule and the acid. On the other hand, nano-silica can be applied with maleic anhydride as a catalyst to successfully improve the wrinkle resistance of silk.

Shortcoming of Nanomaterials
While nanotechnology offers many benefits for the textiles industry, there are some related health and environmental risks. The concern is that nano particles manufactured in industry and in research lab can possibly enter the environment, the food chain, and the human body, but their toxicity is not fully understood. Factors that affect toxicity of nano particles include their surface area and their surface chemistry, and the fact that nano particles of given material can behave differently than larger particles of same composition. Although nanotechnology is relatively new, there is greater potential for negative consequence related to health and environment as nano particles become more widely used.

Nano-technology definitely has the potential for revolutionize almost every industry and textile is no different. Many functional finishes have already been imparted on textiles such as antimicrobial, UV protective, anti soil etc. but these are yet to be vigorously commercialized. A focus on this field would yield many enhanced functional properties on textiles and may pave a new way for development of textiles in general and Technical textiles in particular.

-By Chet Ram Meena &
Neha Khurana

The Textile Association (India)

AHMEDABAD - UNIT

India ITME Society organized a Promotional Show of INDIA ITME 2012 9th India International Textile Machinery Exhibition held on 21st July, 2012 at Hotel St. Laurn Tower, Ahmedabad. The programme was supported by the Textile Association (India) Ahmedabad Unit. Mr. T.L. Patel, President, TAI-Ahmedabad Unit welcomed all the dignitaries, guests and invitees during the function.

Mr. T.L. Patel, President, TAI-Ahmedabad Unit welcoming the gathering

Dr. Chandan Chatterjee, Director CED, Govt. of Gujarat, Gandhinagar was the Chief Guest of the Function. Mr. Ranjikant S. Bachkaniwala, Chairman, India ITME Society delivered speech and highlighted about the forthcoming INDIA ITME 2012 Exhibition through the video presentation of said exhibition. Mr. Purandar Datta, Consulting Coordinator of Design Clinic Scheme for MSMEs- NID, Ahmedabad presented about Design Clinic Scheme at the function. More than 100 invitees attended the function. The promotional show was very much motivating for INDIA ITME 2012 exhibition to be held on 2Nd - 7th Dec, 2012 at Mumbai. Lastly Mr. Sanjay Lathia, Hon. Treasurer of India ITME Society proposed the vote of thanks.

Ms Seema Srivastava, Executive Director, India ITME, briefing about INDIA ITME 2012

Indian Technical Textiles Industry to Reach US $ 28.7 Billion by 2017

By: Seshadri Ramkumar, Texas Tech University, USA

Technical textiles market size in India will skyrocket to US $ 28.7 billion by 2016-17.

Speaking at an event organized by Ministry of Textiles-India and PSG College of Technology in Coimbatore-India on August 3rd, Ministry of Textiles officials were upbeat about the growth prospects of the technical textiles industry in India, according to media reports.

According to government officials, the market size of technical textiles in India will reach US $28.7 billion from the current size of US$ 10.3 billion. Five year's back, the market size of this industry was US$ 7.6 billion.

Industrial segment of the technical textiles is estimated to grow at an annual rate of 11% and contributes 8% of the total technical textiles market.

In 2008, Texas Tech University's report predicted that India's tech-textiles sector will grow in double digits and the next two decades will witness steady growth.

Certification standards for organic textiles unveiled by government

The government introduced national certification standards for organic textiles aimed at boosting their demand in major markets, including Europe and Japan.

The Indian Standards for Organic Textiles (ISOT), which were launched by Commerce, Industry and Textiles Minister Anand Sharma, would be included under the National

Programme for Organic Productions (NPOP). The NPOP, which is a legal regime administered by the Ministry of Commerce and Industry, includes norms for organic production and processing of agriculture crops along with certification standards. Earlier, private standards prevailed in the country for organic textiles and these were not in conformity with the international benchmarks, according to officials. "By introducing ISOT,

India took over the long-standing position of the Global Organic Textiles standards (GOTS), which are private standards prevailing in the organic textiles industry," Commerce Secretary S R Rao said at a function organised by Agricultural and Processed Food Products Export Development Authority of India (APEDA). Also, India has the distinction of being the only

country in the world to have introduced organic textiles standards at the national level, Rao said. During 2011-12, organic textiles exports were pegged at Rs 1,027 crore, according to the data provided by the APEDA.

Italy's Moretti now in India by Siyaram's

The house of Siyaram's has brought Italy's most iconic fashion houses - Moretti to develop a premium range of pure Italian design shirting in India. After having several successful brands like J Hampstead, MiStair, Siyaram's MSD, Oxemburg and the recently launched "Royale Linen" from the House of Siyaram; Moretti comes as a brand that defines style and class.

Speaking on the occasion Mr. Ramesh Poddar - Chairman & MD Siyaram Silk Mills Ltd. said - "In today's time when consumer's fashion taste are constantly evolving we are happy to bring MORETTI into India.

The designs and the palette of shades and textures that Moretti offers will appeal to the fashion conscious Indian Consumers. Moretti offers ensemble of cotton fabrics manufactured from purest of extra long staple cotton that results into 100% comfort & style for its class.

Fabrics from Moretti will have innovative finishes like Liquid Ammonia process, silk protein and easy care finish that resulting into high Crease Recovery, Wrinkle resistance &

recovery, reduced requirements for ironing or enhanced/easier to iron garments, low shrinkage post washing, high Luster, increased fiber elasticity, softer handle, enhanced tensile strength. The signature fabrics that are passed on from generation to generation under Moretti come in appealing designs such as checks, stripes, plains and in extremely inspiring colours.

Texttreasure

Success is not final, failure is not fatal: it is the courage to continue that counts.

- Winston Churchill

India turns net cotton importer despite having record crop

Textile mills have started importing cotton and are likely to purchase 2 million bales in 2011-12 marketing year ending next month, as excess exports have led to the shortage of the fibre in the domestic market. India, the world's second largest cotton grower, has exported about 12.5 million bales (of 170 kg each) in 2011-12 so far. "There is a shortage of cotton in the domestic market as about 12.5 million bales of natural fibre have been exported and arrivals are also less," a Textiles Ministry official said. Textile mills have started importing cotton mainly from the US and Africa and are expected to purchase a total of 2 million bales this year, the official said. General D K Nair, Secretary, Confederation of Indian Textile Industry (CITI) said, "As of now, mills have imported 0.5 million bales of cotton and have contracted for over 1 million bales."

With domestic prices ruling higher than that in the global markets, the Textiles Ministry official said that mills are importing cheaper cotton to meet their domestic demand. The natural fibre prices in India are 10 per cent costlier at Rs 38,000 per candy compared to the global market. The official, further added, mills are facing difficulty in sourcing cotton as arrivals have come down plus the exportable surplus has come to negative because of huge exports.

Based on arrivals, total cotton production is seen to be 33.6 million bales in 2011-12 marketing year, much lower than the Agriculture Ministry's estimate of a record 35.2 million bales for the same period. The domestic requirement is about 26 million bales. Industry experts feel, going forward, the situation might get worse in the coming year as some parts of the major cotton growing states like Gujarat and Maharashtra are facing drought-like conditions.

Century Textiles to launch Digital Print Bed Sets

Century Textiles and Industries Limited has planned to launch its Digital Print Bed Sets in August 2012 for niche market segment along with value addition using embroidery, special finishes and special weaves. The company foucus on expanding its business of Bed Linen in Domestic Market and would like to achieve the sales turnover of more than Rs. 50 crores on ex-factory price in coming 2 years, informed Mr. R. C. Panwar, Joint President, Marketing, Century Textiles.

He also informed that the digital print bed set will be made available to retailers in small lots of 100 pieces and the MRP of the digital print bed set will range between Rs. 2999 to Rs. 4500. These bed sets will be available in six designs in fine to super-fine counts.

It is noteworthy that, the Century Textiles having established itself as an innovative leader in cottons has recently refocused on the 100% cotton bed and linen products. To address the needs of ever changing global market a wide range of bed and linen products of different thread counts, weaves, textures & finishes have recently been introduced. The product range includes bed sheets, towels, quilt duvet covers etc. Century Textiles products are being sold to reputed brands like MACY'S Bblk in USA, Carre Blanc etc.

PICANOL India Moves to New Headquarters in New Delhi

Picanol India has inaugurated its new headquarters on 3rd August 2012 in New Delhi. The official inauguration took place in the presence of H.E. Mr. Didier Reynders, Deputy Prime Minister and Minister of Foreign Affairs, Foreign Trade and European Affairs of Belgium, and Mr. Pierre Vaesen, Ambassador of Belgium to India. Mr. Luc Tack, Managing Director of the Picanol Group, and Mr. Kamal Oswal, Vice Chairman of Nahar Industrial Group, were also present at the inauguration.

During the inaugural address Mr. Luc Tack, Managing Director, Picanol group gave a short introduction of his company. He said that over the space of seven and a half decades Picanol played a pioneering role developer and manufacturer of highly productive weaving systems. He illustrated the figures of his company and production. He was proud in opening a new Indian headquarters with another milestone in the long history of Picanol. He also mentioned that with opening of new office, their ambition does not stop but company will introduce broadest product range in market, improve local services and presence and will remain committed to India and increase their leadership in weaving systems for the Indian weaving sector. He hoped that Picanol will contribute further expansion of Indian textile industry and will continue to deliver the best weaving machines, services and technology to Indian customers.

Mr. Luc Tack, Managing Director, PICANOL Group addressing during inauguration of Picanol India New Delhi office

Mr. P. Kasiviswanathan, Head Indian Operation briefed about the activities of Picanol. He said in recent years, Picanol India has seen a steady growth in its market share, which has led to it becoming the leading provider of weaving machines on the local market today. India is a market of crucial importance for Picanol as it is one of the key textile markets in the world. As part of its further growth plans, Picanol India purchased new headquarters in downtown New Delhi at the end of 2011. The print repair shop and the office, which were located in separate buildings, have been brought together in the new building. The inauguration of the new offices marks a new milestone for Picanol in India. Picanol India also has regional offices in Mumbai and Coimbatore and currently employs 35 people.

"We are excited to expand our operations and move to a new facility. With the broadest product range on the market, improved local services and considerable presence, Picanol remains highly committed to India and plans to be the leading provider of weaving systems for the entire Indian weaving sector. We appreciate all of the support that we have received from both state and local officials, and would therefore like to express our utmost gratitude to the Belgian and Indian government representatives for the excellent co-operation in India" stated Mr. Palanisamy Kasiviswanathan, Head of Indian Operations.

About the Picanol Group

The Picanol Group is an international, customer-oriented group specialized in the development, production and sale of weaving machines and other high-technology products, systems and services. The Weaving Machines division (Picanol) develops, manufactures and sells high-tech weaving machines based on air (airjet) or rapier technology. Picanol supplies weaving machines to weaving mills worldwide, and also offers its customers such products and services as training, upgrade kits, spare parts and service contracts. For 75 years, Picanol has played a pioneering role in the industry worldwide, and is one of the current world leaders in weaving machine production.

The Industries division covers all activities not related to weaving machines: Proferro comprises the foundry and the group's machining activities. It produces cast iron parts for e.g. compressors, pumps and agricultural machinery, and parts for

Picanol weaving machines. Through PsiControl Mechatronics, the group specializes in the design, development, manufacturing and support of technological components, services and mechatronical system solutions for original equipment manufacturers in various industries. Melotte develops and produces innovative product solutions using Direct Digital Manufacturing (DDM) and Near-to-Net-Shape Manufacturing (NNSM) technologies.

In addition to the headquarters in Ypres (Belgium), the Picanol Group has production facilities in Asia and Europe, linked to its own worldwide sales and service network. In 2011, the Picanol Group realized a consolidated turnover of 466.95 million euros. The Picanol Group employs more than 1,900 employees worldwide and is listed on NYSE Euronext Brussels (PIC). For more information, please visit www.picanol.be orwww.picanolgroup.com.

Mr. P. Kasiviswanathan, Head of Indian Operations, Picanol addressing the gathering

Mr. Kamal Oswal, Vice Chairman of Nahar Industrial enterprises Ltd. receiving the memento by hands of Mr. Luc Tack, Managing Director

Mr. Kamal Oswal, Vice Chairman of Nahar Industrial enterprises Ltd. Sharing his experience with Picanol

Mr. P. Kasiviswanathan welcoming H.E. Mr. Didier Reynders, Deputy Prime Minister and Minister of Foreign Affairs, Foreign Trade and European Affairs of Belgium

H.E. Mr. Didier Reynders, Deputy Prime Minister Inaugurating new India headquarter of Picanol

During the inaugural address Mr. Luc Tack, Managing Director, Picanol group gave a short introduction of his company. He said that over the space of seven and a half decades Picanol played a pioneering role developer and manufacturer of highly productive weaving systems. He illustrated the figures of his company and production. He was proud in opening a new Indian headquarters with another milestone in the long history of Picanol. He also mentioned that with opening of new office, their ambition does not stop but company will introduce broadest product range in market, improve local services and presence and will remain committed to India and increase their leadership in weaving systems for the Indian weaving sector. He hoped that Picanol will contribute further expansion of Indian textile industry and will continue to deliver the best weaving machines, services and technology to Indian customers.

AADTT's second batch of students ready to join Indian textile industry

The Advanced Academy for Development of Textile Technologists, a joint venture between Alok Industries Limited and DyStar India Private Limited, recently held its convocation ceremony of their second batch students. Mr. Virender Kumar Arora, Chairman of D Decor Home Furnishing was the Chief Guest for the function and presented the certificate to the passing students. Addressing the convocation, Mr. Virender Kumar Arora, passionately spoke about his student days and congratulated all involved for this unparalleled initiative and achievement. Mr. Arora also extended support to the AADTT activities by offering the required training and employment opportunities to the students of AADTT.

In his inaugural address, Mr. Rajesh Balakrishnan, Managing Trustee of AADTT, spoke on the need for competent professionals in the textile industry who could be groomed into potential leaders of tomorrow and the commitment from both partners, Alok and DyStar, to make this possible through the AADTT. Mr. V. R. Sai Ganesh, General Manager - Business Development, DyStar India and active faculty member of the AADTT, encouraged students to take opportunity of this unique platform, as such opportunities were not available during his student days and thanked the Academy to include him as a part of the faculty. Mr. R. Rajaram, Managing Trustee and President of Alok Industries Limited also addressed the convocation.

India Pavilion in Int'l Fashion Fair in Tokyo

MS. Kiran Dhingra, Secretary, Ministry of Textiles inaugurated the India Pavilion at International Fashion Fair, Tokyo, Japan. Dr. A. Sakthivel, Chairman, AEPC welcomed Secretary, Ministry of Textiles. India's participation in IFF Tokyo has grown to 155 booths. The fair is expected to bring 30,000 buyers in three days.

Ms. Dhingra also witnessed a Fashion Show, showcasing India's fashion, strength and products. There was an overwhelming response of Japanese buyers in India's pavilion. In a bid to give greater impetus to trade and investments in apparel sector, Smt. Dhingra is leading a delegation to Tokyo. Speaking on the occasion she said, "This kind of participation will strengthen the India and Japan Economic Partnership and boost the trade. Under the India- Japan CEPA, India will be benefited by Japanese investments, technology and world-class management practices that come with it. Japan can take advantage of India's huge and growing market and resources, especially its human resources. The Agreement which is comprehensive in nature will further strengthen India- Japan economic ties to the benefit of both countries immensely. CEPA provides a win-win situation for both the countries." The International Fashion Fair is Japan's largest fashion business trade show held twice every year in the months of January and July.

The fair attracted around 800 companies and delegates from 20 countries. The Ministry of Textiles supported the Indian participation. This year, 155 booth spaces were available for display by the 109 companies and 14 booths conducted daily fashion shows. The available data shows that India's apparel trade with Japan has increased despite global slowdown on one hand, and with Japan recovering from the devastating Tsunami on the other hand. The current bilateral trade between India and Japan is a little over US$ 13 billion and it is expected to touch US$ 25 billion by 2014.

Textsmile

Two factory workers are talking.
The woman says, "I can make the boss give me the day off."
The man replies, "And how would you do that?"
The woman says, "Just wait and see." She then hangs upside-down from the ceiling.
The boss comes in and says, "What are you doing?"
The woman replies, "I'm a light bulb."
The boss then says, "You've been working so much that you've gone crazy. I think you need to take the day off."
The man starts to follow her and the boss says, "Where are you going?"
The man says, "I'm going home, too. I can't work in the dark."

Tex Trends 2012 showcased strengths of Indian textile industry

Mr. Anand Sharma, Union Minister of Commerce, Industry and Textiles, inaugurated the Tex Trends India 2012 , featuring over 400 exhibitors and 2000 global buyers displaying diverse range of products from the entire length and breadth of the country said, "I am happy to inform you that the Tex Trends India 2012 truly showcases the strengths of the entire Indian textile industry. It aims to provide the biggest platform in Asia to the exporters and the buyers. The event (Tex Trends) will showcase India's huge potential as an exporting country and will offer a great variety for its global buyers."

Dr. A Sakthivel Chairman AEPC, commenting on the Tex Trends remarked, "We are very hopeful that Tex Trends India 2012 will serve as a much needed platform and an opportunity for a large number of exhibitors and buyers from across the globe to interact under one roof. The response to the earlier Tex Trends was really commendable and this time too it will definitely provide the much needed fillip to the Indian textile industry." India in recent years has been the focal point of continuous growth and development being the second fastest growing economy of the world.

Tex Tends 2012 is an initiative by the Ministry of Textiles, Government of India with financial assistance under the Market Access Initiative (MAI) of Ministry of Commerce & Industry, Govt. of India. AEPC, the largest Export Promotion Council has been entrusted with the task of lead agency to organise this exhibition along with other Textile Export Promotion Councils.

The development activities of the Ministry of Textiles are oriented towards making adequate quantities of raw material available to all sectors of the textile industry and augmenting the production of fabrics at reasonable prices from the organised and decentralized sectors of the industry.
The Ministry also lays noticeable emphasis on the development and growth of handlooms, traditional handicrafts and craftsmanship from across the region. The event has exhibitors from across the length and breadth of India, including Tamil Nadu, Mumbai, West Bengal, Rajasthan, Uttar Pradesh, Gujarat, Madhya Pradesh and Punjab.

Punjab power hike to turn textile industry uncompetitive

The Punjab industry opposed the 12 per cent hike in power tariff saying 'huge jump' in power rates would lead it to turn "more uncompetitive" against industries in other states like Madhya Pradesh, Himachal Pradesh.

Textile major SEL Manufacturing, Executive Director, V K Goyal said, "The hike in power tariff will certainly put the local textile industry into a disadvantageous position vis-a-vis other states like Madhya Pradesh as our industry will become more uncompetitive now."

According to industry representatives, rising input cost caused by increase in electricity charges and land cost would 'force' the industry to expand in other states where the cost of production is much lower than what costs in Panjab. Power is about 20 per cent cheaper in Madhya Pradesh compared to in Punjab. Ludhiana based textile groups like Vardhman, Nahar, Trident, SEL have already expanded their industrial capacities in Madhya Pradesh. Punjab State Electricity Regulatory Commission announced an average hike of 12.08 per cent in power tariff on all categories of consumers for 2012-13 and 10 paise per unit on 16th July 2012 has also been levied for the first time on continuous process industry including textile, spinning, casting which will be applicable from November 1 this year. Spinning sector termed the imposition of 10 paise per unit only on continuous process industry as a 'deplorable' step and said, "the spinning sector was being penalised with this levy". "There is already a slowdown phase and now increase in power rates will prove to be double blow to the textile industry," T-shirt maker Duke Group, Chairman Komal Jain said.

Textsmile

Two boys were arguing when the teacher entered the room. The teacher says, "Why are you arguing?"
One boy answers, "We found a ten dollor bill and decided to give it to whoever tells the biggest lie."
"You should be ashamed of yourselves," said the teacher, "When I was your age I didn't even know what a lie was."
The boys gave the ten dollars to the teacher.

Trends in Textile Spinning Industry clubbed with India ITME Road Show on 12th July, 2012 at The Residency, Coimbatore.

In its introductory speech Mr. N.D. Mhatre, Dy. Director General (Tech), ITAMMA mentioned that ITAMMA has always taken initiative in organizing various activities for its members and as a whole for the TEI. During this event also ITAMMA is playing a catalyst role of inviting two important identities from two different disciplines of Textile Industry i.e Mr. T. Rajkumar our Chief Guest and Vice Chairman, SIMA representing Textile User Industry. And Mr. R.S. Bachkaniwala, Chairman, India ITME Society who will be organizing an International Exhibition of Textile Machinery and Accessories, India ITME 2012 from 2nd -7th December, 2012 at Mumbai.

This Event will prove to be an excellent opportunity for both the disciplines of the Textile Industry to know the details of the forthcoming Mega Exhibition.

In his Welcome Speech Mr. Naresh Mistry, Incoming President, ITAMMA,
Said, "ITAMMA, being an oldest and largest Association in India representing Textile Engineering Industry, has always taken initiatives for the benefit of its members and Textile Engineering Industry as a whole, in the field of knowledge enriching and business growth. We are happy to mention here that ITAMMA, even though being a body representing Textile Engineering Industry of India; has taken many initiatives in strengthening the bond between Textile Manufacturing Industry and Textile Engineering Industry which is utmost essential today for developing both the industries in the areas of Technology, Knowledge and Business. It is a known fact that, this was the equation which lead the success of European Textile Engineering Industry, and which has resulted in the development of State-of- the- Art Textile Machines.

It is our pleasure to have a representation of Textile Manufacturing Industry and that too in the form of our Chief Guest, Shri T. Rajkumar, Dy. Chairman, SIMA. SIMA, established in 1933, with a present strength of 375 textile mills, having about 93 lakh spindles (i.e. 24 of total spindalage of the country) and 5700 looms.

He also said that "India ITME 2012" the largest and most prestigious textile engineering event will be held in India from 2-7 December, 2012; which will give an opportunity to both the disciplines of the Textile Industries in enriching their knowledge & growing their business.

We are fortunate to have with us Mr R S Bachkaniwala, Chairman India ITME Society, to high lighten us about the India ITME'2012 Exhibition.

Mr. R. S. Bachkaniwala - Delivering Special Address

In the speech of Mr. R. S. Bachkaniwala, he mentioned following aspects

This year, India ITME will see 700 participants from 45 countries out of which 6 new countries (Pakistan, Thailand, Slovakia, Netherland, Indonesia, Malaysia) participation received for India ITME 2012 covering over 65,000 sqm. of exhibition area, and 100,000 visitors making it the largest and most prestigious Textile Engineering Exhibition in India and one of the renowned exhibitions in the world showcasing Textile Technology. INDIA ITME 2012 will be the one stop shop for trendsetting textile manufacturing solutions. New sectors like garment making machinery, garment processing machinery, auxiliary machinery & accessories, as well as dyestuff & chemical products for the textile industry will also be in the spotlight.

Keeping each participants interest in mind and to provide maximum value for time and money spent to visit ITME event, we have organized an array of programs during ITME 2012.

- Complimentary pre- fixed business meetings
- Technical Seminars
- Gujarat Focus day
- Product launches
- Special branding and promotion opportunity
- Cultural display and evening programs
- Event Newsletter by WTIN (UK)

Being held right at the heart of world's 2nd largest textile industry, it is an event nobody can miss. The event is focused to meet the business requirements of:

- Textile machinery, accessories and component Manufacturers
- Distributors/Dealers
- Exporters / Importers
- Buyers/Sellers/Retailers State Government Bodies
- Textile Engineers
- Fashion & Textile Designers
- Research organizations & students
- Publications
- Consultants Textile parts and SEZ

For the 9th India International Textile Machinery Exhibition space booking closed one year ahead which shows the excitement and interest with which the event is looked at. Presently we have 420 companies in wait list with additional spaced for 11,000 sqm.

INDIA ITME 2012 is a premium capital goods export facilitate event with Engineering Export Promotion Council (EEPC- Ministry of Commerce & Industry), Basic Chemicals, Pharmaceuticals & Cosmetics Export Promotion Council (CHEMEXCIL-Ministry of Commerce & Industry), Taiwan Association of Machinery Industry (TAMI) and European Union India Chambers supporting this event. The State Partner is the Government of Gujarat, The Knowledge Partners are Bombay Textile Research Association (BTRA), The Synthetic & Art Silk Mill's Research Association (SASMIRA), The Central Institute for Research on Cotton Technology(CIRCOT), Textile Institute - Manchester, UK, Sardar Vallabhbhai Patel International School of Textiles & Management (SVPITM), Institute of Chemical Technology(UDCT) and D.K.T.E. Society's Textile & Engineering Institute, For this upcoming ITME we have closed space booking one year ahead which shows the excitement and interest with which the event is looked at.

Dr. Christian Schlinder, Director General, ITMF, Zurich, Mr. Andreas Weber, from Swisstex/ World President, The Textile Institute, Manchester, UK, Prof. Dr. Roshan Shishoo, Sweden have confirmed their presence during the ITME technology seminar as esteemed speakers.

Visitor Registration:
Special incentives are offered for early bird registration & complimentary business meetings are also being organized. To avail early bird discount (25%) please register online at www.india-itme.com before 31st August 2012.

ITME Society is actively promoting nationally & Internationaly to attract lagre no. of visitors through advertisement & road shows ITME 2012, We already done promotions in Barcelona, Spain - September 2011, Bangladesh - 10th February, Bhilwara - 6th April, Indonesia - 19th April, Bhopal - 28th April, Indore - 12th May, Ichalkaranji - 19th May, Salem - 16th June. Apart from this we also have promotion in Vidharbha - 28th July, Ludhiana - 25th August 2012.

ITME Pavilion at Vibrant Gujarat 2013 For the first time India ITME Society is participating in VIBRANT GUJARAT 2013 with ITME pavilion. This is open for all textile and textile engineering categories. The registration form is available on ITME website homepage and bookings are open for the same.

In the Speech of Chief Guest, Mr. T. Rajkumar he gave detailed information on:

Mr. Naresh Mistry, Incoming President,ITAMMA, offering memento to Mr. T. Rajkumar, Vice -Chairman, SIMA)

Trends in Textiles:

- Today India has become the most efficient and cost competitive in the global cotton yarn trade business. However, the country is saddled with poor technology levels in weaving and processing sectors due to which our global share is less than 5%. Though the country attracted over Rs. 2.10 lakh crore of Investment in the modernization and expansion and Greenfield projects during the last 21 years, the country is yet to go a long way to bridge the technological gap in weaving and processing sectors.Small scale of operation is yet another bottleneck for the country preventing supply to the large retailers. The antiquated labour policies and various benefits given for SSI sector in terms of fiscal levies and other benefits made the Indian textile industry highly fragmented. This has resulted in lower productivity, high cost and poor systems, obsolete technology, etc.

- We need to encourage consolidation and the scale of operation to remain cost competitive and also grab the opportunities of large retailers.

- Government also should take de care while signing various trade agreements and implement the GST, reduce cost of transaction to become competitive.

- As far as the processing is concerned, the treatment of textile effluents in a cost effective manner and meeting the pollution norms have become major issues. Marine discharge is the technology being practiced across the globe. Zero Liquid Discharge (ZLD) is not practiced anywhere in the world commercially. Probably, some countries and some States might allow pollution unnoticed as it was in practice during the last cople of decades even in Tamilnadu. Our country has to earmark few thousands of acres of land along the sea shore with necessary provision of desalination plants to overcome the water shortage and pollution issues.

- The 12th Five year Paln work group has set an ambitious target of attracting Rs. 1.45 lakh crores investments in the textile industry. CITI and SIMA have already indicated to the government to give more benefits for the weaving and processing sectors, which are the weakest links to enhance the value addition. We have also made concerted efforts to extend the Technology Upgradation Fund Scheme throughout 12th Five year Plan period. Though Government has already announced extension of the scheme without any break up to 31st March 2013, the government is yet to announce the new Scheme for the remaining four years.

- Though the Scheme has been in vogue without any break right from 1st April, 1999 the Scheme was suspended during the period 29.6.201 to 27.4.2011. This has seriously affected the projects worth Rs. 23,000 crores. Though the Government has denied giving benefit for the block out period, SIMA is making all its efforts to get the benefit for the black out period.
- Today the trend is making investments in processing, weaving and technical textiles. We need to concentrate on value addition rather than making investments in spinning. If you look at the types of companies or projects, vertically integrated units are being able to overcome all the challenges and sustain a reasonable profit. This is the main reason why more than 200 leading companies in the country are growing at a faster rate

.

- The high volatility in cotton and yarn prices mainly caused due to short sighted policies of the Central Government on cotton and yarn exports. The industry, particularly SME's incurred huge cash losses and erosion of working capital during the year 2010-11. SIMA made concerted efforts for almost one year to get the debt restructuring package consisting of Rs. 35,000 crores with the facility of two year moratorium, conversion of eroded working capital into working capital term loan and relaxation of NPA norms by RBI. Though the RBI has denied our plea, the Finance Ministry has already sent communications to the bankers for reconstructing facility and the Ministries have convenced a meeting tomorrow (July 13, 2012) at 2.30 pm. We are hopeful of getting some fruitful results.

- Today the industry has started reviving and what we need is some breathing time for repayment of loans and adequate working capital. In my opinion, the Indian textile industry has bright future owing to increasing cost of production in China and other countries.
- I request the manufacturers and suppliers of textiles spares and accessories and machinery manufacturers to be innovative and cost effective to sustain our competitiveness in the globalized economy. I am sure you R & D and innovative kills would greatly benefit the mother industry to be the clothier of the world.

Finally Mr. Senthil Kumar, Hon Treasurer, ITAMMA delivered a Vote of thanks:

Mr. Senthil Kumar- Delivering Vote of Thanks

Textsmile

On a crowded bus, one man noticed that another man had his eyes closed. "What's the matter? Are you sick?"
"No, I'm okay. It's just that I hate to see an old lady standing."

New economy brand MAKERS from Raymond in Rajasthan

Raymond Limited, India's leading textile and apparel manufacturer & retailer, announced the launch of its new economy brand - MAKERS - in Rajasthan. With this launch, MAKERS aims to replicate the success of Northern and Eastern markets here. It will be covering 2300 retail outlets spread across 216 towns in 33 districts by the fiscal end. The brand also announced the launch of India's first insurance scheme for retailers in the State. This Group Personal Accident Policy provides annual insurance cover of up to Rs 10 lakhs for MAKERS retailers and their two salesmen are also covered under this scheme Raymond has always cared for its retail partners and this is a small gesture of acknowledging their contribution in the making of MAKERS brand in market.

Mr. Ram Bhatnagar, Vice President - Emerging Businesses of Raymond Limited said, "Raymond is renowned in India and globally for its pioneering strengths in the manufacturing and retailing of worsted textiles. The launch of MAKERS in Eastern markets a year ago marked the textile giant's foray into the economy segment and in retailing poly viscose fabrics. After successful East and North India launches, we are pleased to enter the Rajasthan markets. MAKERS with youth centric product designs and quality assurance which is the hallmark of Raymond has resulted in the brand receiving an overwhelming response in Eastern and Northern markets. We foresee significant scope of growth for the brand in popular price segment across the nation and especially Rajasthan given the style-consciousness and increasing aspirations of the Indian youth. People here are energetic, enthusiastic and colourful which reflects in their day-to-day dressing fashion. MAKERS aims to address the needs of this populace with its wide range of fabric colours, matching options and appropriate pricing. Rajasthan has been a stronghold for Raymond and we believe that will be the same for MAKERS as well."

Keeping in mind the preferences of the youth today, the MAKERS range has youth-centric vibrant designs, fancy colours and special emphasis on innovative finishes. The collection comprises a carefully selected design pallet ranging from stripes to self, micro structures and checks.

Jindal Group to set up Rs. 1500 crore textile unit in Nashik

Jindal Group will set up a Rs 1,500-crore technical textile unit in Nashik district of North Maharashtra. Textile Minister Mohammed Arif Naseem Khan told PTI that a letter of intent (LoI) has been issued in this regard after the Group officials met him last week.

The Group is currently in the process of acquiring land. About 100 acres will be required for the unit which will manufacture cloth related to automobile applications, sports, security, medical and fire fighting equipment, he said. Technical textile products are used primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics.

Investment proposals worth around Rs 5,000 crore had been received ever since the Government announced a new textile policy a couple of months ago, the Minister said. The policy, which focuses on cotton growing belts of Vidarbha, Marathwada and north Maharashtra, provides for incentives like 10 per cent capital subsidy. Khan said 162 projects are being covered under the new textile policy. He said road shows are being planned in Gujarat, Karnataka and Tamil Nadu to attract investors in the key sector.

DyStar celebrates 115 years of technical Indigo synthesis with expansion of its Indigo prodn capacity in Nanjing

Singapore - DyStar and its owner, the Zhejiang Longsheng Group, celebrate 115 years of technical Indigo synthesis at Ludwigshafen, Germany, where the first commercially feasible manufacturing process was launched.

The history of synthetic Indigo goes all the way back to 1897, with the introduction of, "pure indigo" from BASF. Demand for synthetic Indigo dyes was so huge that by 1913, natural indigo had been almost entirely replaced. To date, more than 260,000 tons of the dye has been produced at the Ludwigshafen production plant. This is sufficient to dye about 26 billion pairs of jeans which, if lined up end-to-end, would cover the distance from the earth to the moon 87 times, informed a press communiqué received from the company. With its patented DyStar Indigo Vat 40% Solution, DyStar has contributed to the continuing success story of synthetic Indigo. "Pre-Reduced Indigo is a very consistent and clean type dye" notes Dean Barley, Denim Dye Department Manager from Mount Vernon Mills. "Having a consistently clean Indigo helps us produce more first quality denim day in and day out. More first quality goods also generate more money to the bottom line." The constant improvement of the manufacturing process over the years has paved the way for DyStar's current success. The numbers speak for themselves with double digit growth rates in the major denim manufacturing areas e.g. 40% growth in South Asia. "In anticipation of greater demand for DyStar Indigo Vat 40% Solution and an increased market share, the DyStar Group is planning to expand capacity at its Nanjing Indigo plant in China," said Harry Dobrowolski, CEO of the DyStar Group. The expansion reaffirms DyStar 's commitment to the denim industry.

As global awareness of environmental issues created by the textile supply chain increases, Brands, Retailers and their industry partners are looking for more sustainable solutions for their businesses. With the recently announced project to develop electrochemical dyeing of Indigo in collaboration with RedElec, DyStar is maintaining its position as the leading sustainable solution provider.

India and Mauritius to expand trade ties in textile sector

The MoU which was signed by Union Minister of Commerce, Industry and Textiles Mr. Anand Sharma and Mr. Arvin Bollel, Mauritian Minister of Foreign Affairs, Regional Integration and International Trade, is aimed at enhancing the trade and economic relations by expanding business and cooperation in the sphere of textiles, clothing and fashion industries, exchange of information and documents, transfer of technology and sharing and adopting best practices in production, productivity and quality improvement, fashion and design, product development and executive development programmes between the two countries.

During the meeting it was informed that the first meeting of the Joint Committee on Cooperation about the textile and clothing industry to India will be held from July 23, 2012 here. After signing the MoU, the Ministers also agreed to hasten the Preferential Trade Agreement (PTA) negotiations. They also agreed to deepen economic engagement between the two countries.

Mr. Sharma said that "the bilateral economic and commercial ties have shown a healthy upward trajectory, but there is still a lot of untapped potential in diversifying our commercial exchanges." The bilateral trade between India and Mauritius in 2011 was US$ 1.395 billion as compared to US$ 0.687 billion in 2010. While the exports in 2010 were US$ 0.671 billion which increased to US$ 1.361 billion in 2011, the imports of US$ 0.015 billion in 2010 has increased to US$ 0.034 billion in 2011. During January-May 2012, exports have been US$ 0.517 billion, while imports have been US$ 0.012 billion.

Textsmile

On a crowded bus, one man noticed that another man had his eyes closed. "What's the matter? Are you sick?"
"No, I'm okay. It's just that I hate to see an old lady standing."

Dow & Aksa form JV for carbon fiber

The Dow Chemical Company, through its wholly owned subsidiary Dow Europe Holding BV, and Aksa Akrilik Kimya Sanayii A.S., a worldleading acrylic fiber company, announced the official formation of DowAksa Advanced Composites Holdings BV (DowAksa), a joint venture (JV) to manufacture and commercialize carbon fiber and derivatives. Aksa and Dow had previously signed a definitive agreement to form the JV on December 20, 2011.

DowAksa will develop and globally market a broad range of products and technical service
support in the rapidly expanding carbon-fiber composites industry. The JV will have a particular focus on bringing solutions to market that reduce overall costs, thereby enhancing economics and driving adoption in a broader array of markets.

Emphasis will be on bringing cost-effective solutions to industrial market applications for
energy, transportation, and infrastructure globally. Very strong and lightweight, carbon-fiber based materials are used in a variety of applications in growth industries, where weight savings, emissions reduction, durability, and energy efficiency are key performance factors. Currently, the carbon fiber composites industry is estimated at USD $10 billion globally and is expected to reach USD $40 billion by 2022.

RIETER The right draw frame to meet every need

With some 30 000 RSB/SB draw frames sold, Rieter is the world's leading draw frame manufacturer. Our draw frame innovations create competitive advantages for our customers. Rieter's all-round draw frame portfolio offers the right draw frame for every need with regard to quality, productivity, operator convenience and available space. An overview of all draw frame models is given here.

All Rieter autoleveler draw frames incorporate highly dynamic RSB autoleveling technology. This ensures the highest quality standards in the yarn and the end product as well as outstanding running properties in downstream production stages. All Rieter draw frames feature virtually identical technology components, such as top rollers or coilers, so that spare parts can be utilized flexibly.

RSB-D 45 and SB-D 45 - the line for maximum flexibility

The SB-D 45 without leveling, together with the RSB D 45, provides for highly flexible lines with maximum efficiency up to 1100 m/min. These two models are largely identical in design - which facilitates operation and maintenance. A unique feature is the CLEANtube device for clean sliver coiling, which is especially advantageous when processing soiled cotton.

RSB-D 22 and SB-D 11 - the line for limited spaces

Two SB-D 11 and one RSB-D 22 are perfect partners where maximum output of up to 1100 m/min in conjunction with minimum available space and low capital investment is called for. The RSB-D 22 ensures maximum quality, flexibility and productivity with independent machine sides and autoleveling systems.

RSB-D 45c and RSB-D 22c - the alternatives in the Rieter combing line

The RSB-D 45c and RSB-D 22c autoleveler draw frames are specifically designed for use after the combing process. Maximum delivery speed is 550m/min.

RSB-D 35 CUBI can - for large capacities and low operator effort

The RSB-D 35 CUBIcan autoleveler draw frame fills rectangular cans at up to 1000 m/min. CUBIcans hold up to 65% more sliver material than round cans, offering corresponding advantages in operation, quality and efficiency on the spinning machine.

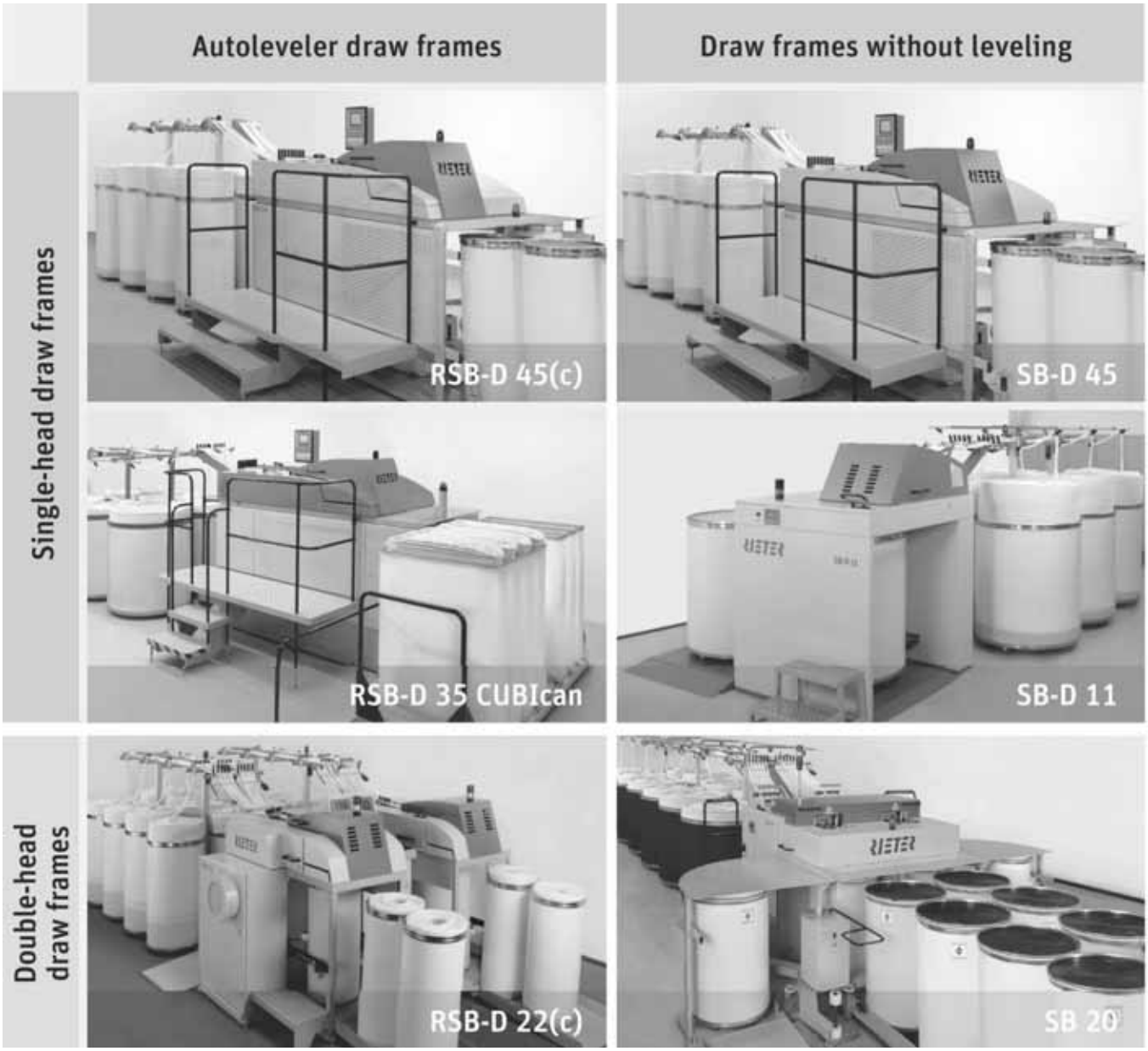
SB 20 - the double-head draw frame for large can formats

With output of up to 1000 m/min, the SB 20 double-head draw frame without leveling is the ideal preliminary stage of combing preparation before the UNllap or OMEGAlap. The machine also offers large delivery can formats of up to 600 mm with can changer and 1000 mm without can changer.

Texttreasure

The first step in the acquisition of wisdom is silence, the second listening, the third memory, the fourth practice, the fifth teaching others.

-Solomon Ibn Gabriol



The all-round draw frame portfolio systematically caters to all customer needs.

Oerlikon Textile reports less order intake and higher sales figures

Oerlikon Group has better results in view to sales and EBIT but Oerlikon Textiles reports less order intake, order backlog and higher turnover and EBIT for the first half of the ongoing year as against last year's comparable period.

Group order intake fell from CHF 2149 to CHF 1952 million or 10 % less, order backlog dropped from CHF 1605 to CHF 1319 million or 18 % less, but turnover increased by 3 % or from CHF 1900 to CHF 1951 million. EBIT rose from CHF 109 million to CHF 267 million or 34 % more and EBIT, excluding non-recurring items, increased by 15 % or from CHF 207 to CHF 228 million.

Oerlikon Textile reports a 16 % lower order intake from CHF 1195 to CHF 1000 million and order backlog decreased by 24 % or from CHF 1399 million to CHF 1012 million, however sales increased by 4 % or From CHF 978 to CHF 1015 million and EBIT by 89 % or from CHF 76 to CHF 144 million and EBIT, excluding non-recurring items, rose 38 % or from CHF 76 to CHF 105 million. The EBIT margin therefore increased from 7.8 % to 10.4 %. The order intake in the second quarter of 2012 decreased by 13 % or From CHF 569 to CHF 496 million whereas sales remained with CHF 520 million at the level of the same quarter of 2011. EBIT rose 45 % in the second quarter or from CHF 38 to CHF 55 million and EBIT margin rose from 7.3 % to 10.5 %. Oerlikon Textile notes a weaker contribution from the natural fibres businesses whereas demand from the manmade fibre areas remained strong and reports the highest order intake for five consecutive quarters and filled order books until 2014. This segment represents now the largest sub segment for Oerlikon Textile.

Trade quarrels between India and China According to a report of the Wall Street Journal and other sources, India is frustrated that trade between India and China is tending to the benefit of China because the trade deficit with China jumped in the last fiscal year (end of March) to nearly USD 40 billion being the largest contributor to the country's overall gap between exports and imports and puts the subject on top of the agenda when meeting with Chinese officials during August

India's government is convinced that this development is a serious economic threat for the country. The nation's current account deficit (balance of trade with the world) amounted to 4.5 % of GDP Gross Domestic Product in the last fiscal year and was an all time high, leading in consequence to a sharp depreciation of the INR and is putting enormous pressure on India to attract foreign capital.

India wants for its value added products more access to the Chinese market and wants China to increase government procurement in sectors such as pharmaceuticals. India submitted to China a list of 916 goods that it believes China should purchase in larger quantities. In fact, India's drug and fi8ne chemical exports to China have fallen 12 % since 2007 to a total of USD 108 million, whereas sales to American have more than doubled during the same period to close to USD 2 billion. India's pharmaceutical companies are the leading suppliers of low-cost generic drugs to treat everything from high cholesterol to stomach infections and those products have great success in the U.S., Great Britain, Germany and other Western markets and helped to boost India's exports of drugs and fine chemicals from USD 3.3 billion in 2004 to USD 10.4 billion 2011.

India is flooded with Chinese goods from heavy industrial equipment to laptops and cosmetic. In a bit more than a decade China moved from rank seven to rank one as source of Indian imports, overtaking the U.S.A., Germany and Japan. India wants to curb this influx of goods and has put at the end of July a 21 % tariff on imports for big power projects in order to protect local manufacturers from Chinese competitors. But the reverse side of the medal: India needs advanced Chinese power technologies to put "steam" into the biggest power plant projects. China supplies over 40 % of India's power gear. The flood of Chinese goods into India is on display in the narrow congested alleys of Sadar Bazaar in the old section of Delhi (built by the Mughals). Tiny shops in shabby building sell toys, hardware, costume jewellery, cosmetics, home appliances and hosiery. Five years ago, Chinese goods amounted only to 5 % of their inventory, but now they account for more than 50 % and instead of sourcing in India, traders go frequently on purchase tours to China. Some of them have wholesale and retail operations and are spending some 15 days per month living in China to source all kinds of goods.

Some India officials accuse China to effectively block Indian exports by not giving certain Indian products market access, outside experts don't think that China is barring Indian products but see the reason in India's inability to produce quality manufactured goods. China exports a wide variety of sophisticated products with higher profit margins and creating more domestic jobs. The value of China's telecom exports amounted to USD 6.7 billion in the last fiscal year. India's lion share of exports to China is raw material (mostly cooper and iron ore).
Countries like the U.S.A., Brazil and Russia also run large trade deficits with China. India's concerns however are sensitive, given the fact that China and India are neighbouring rivals with clashing strategic interests. India is worried about China's influence over Indian Ocean shipping lanes and China is wary of India's oil-exploration in the South China Sea.

DyStar refinances an original credit At the time of the acquisition of DyStar in 2010 the major financing source was a credit facility with the State Bank of India (SBI)

On August 3, 2012 DyStar Global Holdings (Singapore) Pte Ltd reports that it refinanced such SBI credit facility and is reducing borrowing cost and allowing at the same time to improve cash flow and to accelerate the strategic, long-term growth plans of the company. The refinancing allows further the release of worldwide assets that were pledged for the SBI credit facility.

DyStar was originally acquired in December 2010 by the Indian Kiri Dyes and Chemicals Group (today Kiri Industries) and belongs now to the Zhejiang Longsheng Group (PRC), the later explains also why the refinancing has taken place by necessity.

The transaction was commented by Harry Dobrowolski, CEO of DyStar: "This transaction was one of many strategic steps in the process of establishing DyStar as a long-term supplier of textiles dyes, chemicals and services to the global textile market and he feels comforting to have this financial flexibility worldwide especially whilst many global economies are facing difficulties".

ADVERTISEMENT INDEX

10th International & 68th All India Textile Conference

The Textile Association (India)

Jointly Organised by Mumbai Unit & Central Office

Theme : **World Textile - Challenges towards Excellence**

Day & Date : Friday & Saturday, 30th November & 1st December 2012

Venue : Hotel ITC Maratha, Sahar Road, Andheri (E), Mumbai - 400 099

TAI, Mumbai Unit and TAI, Central Office will jointly hold 2012 All India Textile Conference in Mumbai on November 30 & December 1, 2012 (i.e. Friday & Saturday). This Conference will provide a Double Treat to the Textile Professionals as it will coincide with the India-ITME Exhibition which will be held from 2nd to 7th December 2012. This will be wonderful opportunity to those who intends to visit India ITME Exhibition to listen to global experts as well senior textile magnets including beaurocrates, who will be specially visiting for attending India-ITME Exhibition. The Conference will cover topics and panel discussions which hitherto not covered so far. So book your dates for double treat Textile Conference & India ITME. We are expecting over 500 participants to attend this conference.

This Conference will be discussing the topics which are influencing & affecting as well as posing challenges to the textile industry. Some of the topics are:

- Textile Business Potentials of BRIC regions and possibilities of trading in local currencies
- Textile Business in Asian Countries
- Business opportunities n Burma and Africa - Emerging new low cost production centres
- Financials - Banks & institutional support for textile projects
- Surviving in currency fluctuation situations
- Supply chain management & logistics
- Consumer expectations & rising demands
- Environmental issues & overcoming these regulations
- State and Central Government Policies & their strategic plans to support to the textile industry
- Initiative Fibre - Natural & man-made, including Organic Cotton
- Innovation in textile machinery
- Innovations in chemicals & dyes to beat the challenges
- Textile Operation / Process with unconventional energy sources
- Development potential in non apparel sector

The international conference provides an excellent opportunity for companies to gain global visibility and publicity by promoting their products and services to a highly focused audience besides networking with the participants from various parts of the world. Your participation in this conference by way of sponsorships, advertisements and delegates would provide a common platform to meet the experts from the industry. The main advantage will be an opportunity to exchange views on the latest developments in the textile industry.

We appreciate your support to The Textile Association (India), Mumbai Unit in its activities and it is our pleasure to invite you to be part of this event. Let us join hands to make this conference a great success.

D. R. Mehta	**C. Bose**	**V. C. Gupte**	**Arvind Sinha**
National President, TAI	President, TAI, Mumbai Unit	Chairman, TAI, Mumbai Unit	Conference Advisor

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For further details please contact:

Hon. Secretary

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Website: www.textileassociationindia.com

or

The Textile Association (India), Central Office

Tel.: 022-2446 1145 Fax: 91-22-2447 4971 E-mail: taicnt@gmail.com / taicnt@mtnl.net.in Website: www.textileassociationindia.org

INDIA

Tex Summit 2012

Date : 5 Dec. 2012
Venue : Bombay Exhibition Centre
Organizer : Institute of Chemical Technology (Formerly UDCT)
Contact : Prof. (Dr.) M.D. Teli
N.P. Marg, Matunga (E), Mumbai-19
Tel. : +(91)-(22)-33612811
Fax : +(91)-(22)-33611020
Email : texsummit2012@gmail.com

INDIA ITME 2012 - 9th India Internatioal Textile machinery Exhibition

Date : 2-7 December 2012
Venue : Bombay Convention & Exhibition Centre, Mumbai
Contact : India ITME, Society Route Map 76 Mittal Tower, 'B' Wing 7th Floor, 210 Nariman Point, Mumbai - 400 021.
Tel. : +91-22-2202 0032 / 2282 8132 / 2285 1579
Fax : +91-22- 2285 1578
E-mail : contactat@india-time.com

Vastra 2012, International Textile & Apparel Fair

Date : 22nd to 25th November 2012
Venue: EPIP, Sitapura, Jaipur, India
Contact : Mr. Amit Gupta, Senior Assistant Director Federation of Indian Chambers of Commerce and Industry (FICCI), Rajasthan State Council 202, Rajputana Tower, 2nd Floor, House No. A-27-B, Shanti Path, Tilak Nagar, Jaipur - 302 004, Rajasthan, India
Tel. : +91-141 2621345, 5103768, 4061345,
Fax : +91-141 5116464
E-mail : amitgupta@ficci.com, vastra@ficci.com
Website : www.ficci.com, www.vastratex.com

ABROAD

51st Dornbirn Man - Made Fiber Congress

Date : September 19 - 21, 2012
Venue : The Kulturhaus Dornbirn Congress Centre, Dornbirn, Austria
Austrian Man Made Fibers Institute (Austrian - MFI)
Osterreichisches Chemief Aser Institut
Contact : Congress Office :
Romerstrasse 2, A-6900 Bregenz, Austria
Tel. : +43 (0)5574 54720
Fax : +43 (0)5574 43443 4

28th IAF World Apparel Convention 2012

Date : September 24 - 28, 2012
Venue : Sheraton Parto Hotel & Spa, (Oporto), Portugal
Contact : Marier Solle
Romerstrasse 2, A-6900 Bregenz, Austria
Tel. : +31 30 232 09 01
Fax : +31 30 232 09 99
E-mail : solle@iafnet.com

6th Aachen Dresden Internationl Textile Conference 2012

Aachen Dresden is an international textil conference specially for the experts in the field of Textile Chemistry, Finishing & Functionalization.

Date : November 29 -30, 2012
Venue : Germany
Contact : Ms Annett Dorfel
Institue of Textile Machinery and High Performance Material Technology at TU Dresden, Germay
Tel. : +49 (0)351 463 39321
E-mail : annett.doerfel@tu-dresden.de
www.aachen-dresden-itc.de

IGATEX 2012

Largest Textile & Garment Machinery Exhibition

Date : 3rd to 6th October 2012
Venue : Expo Centre, Lahore, Pakistan
Contact : Project Manager FAKT Exhibitors (Pvt) Ltd., 304, 3rd Floor, Clitton Centre, Block-5 Clitton, Karachi, Pakistan
Tel. : +92-21 35810637, Fax: +92-21 35810636
E-mail : info@fakt.com.pk
Website : www.igatex.pk

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- Autodoffer (optional) with provision for bobbin transportation system

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