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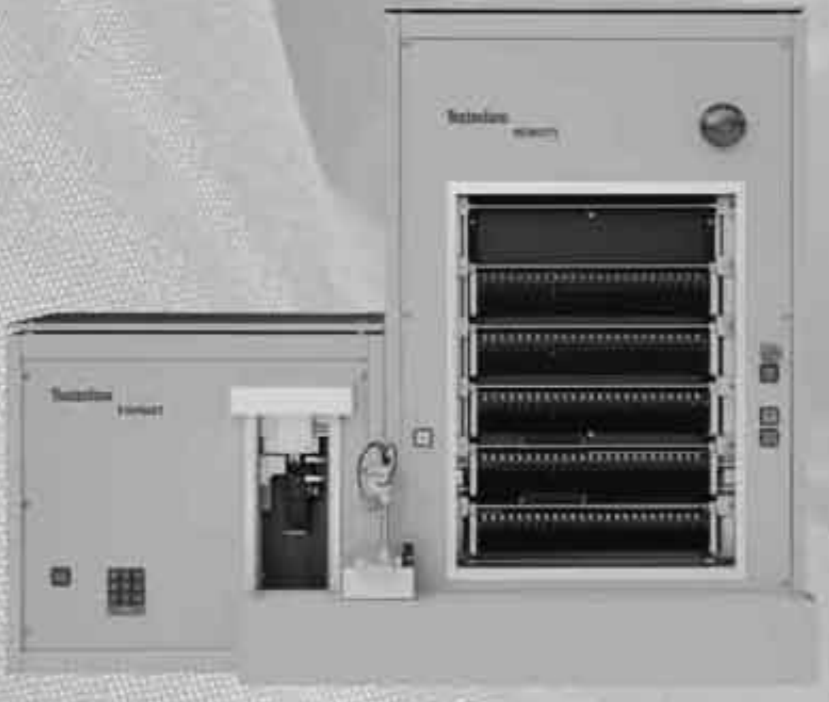

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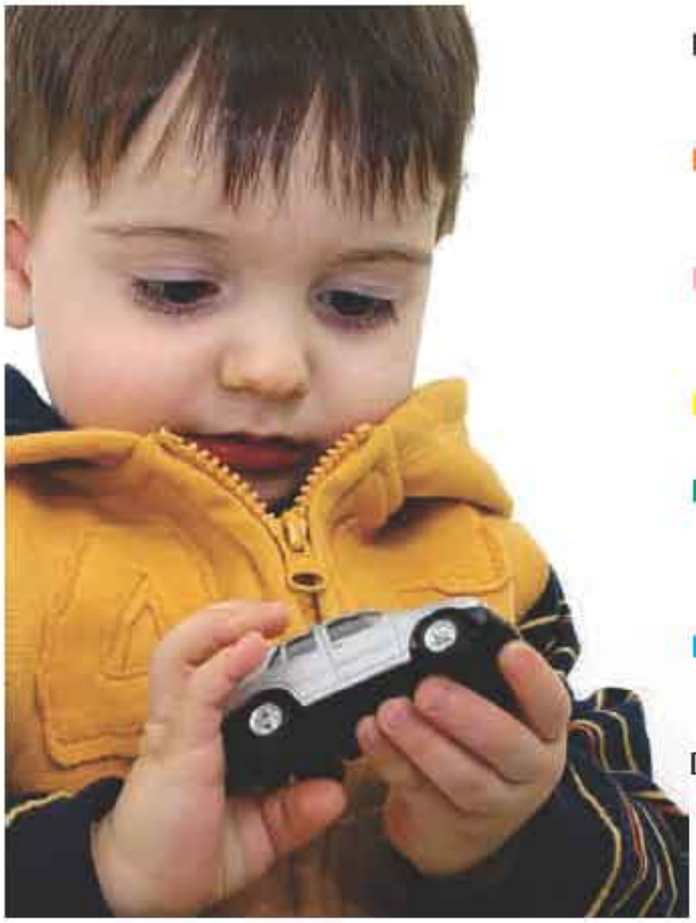

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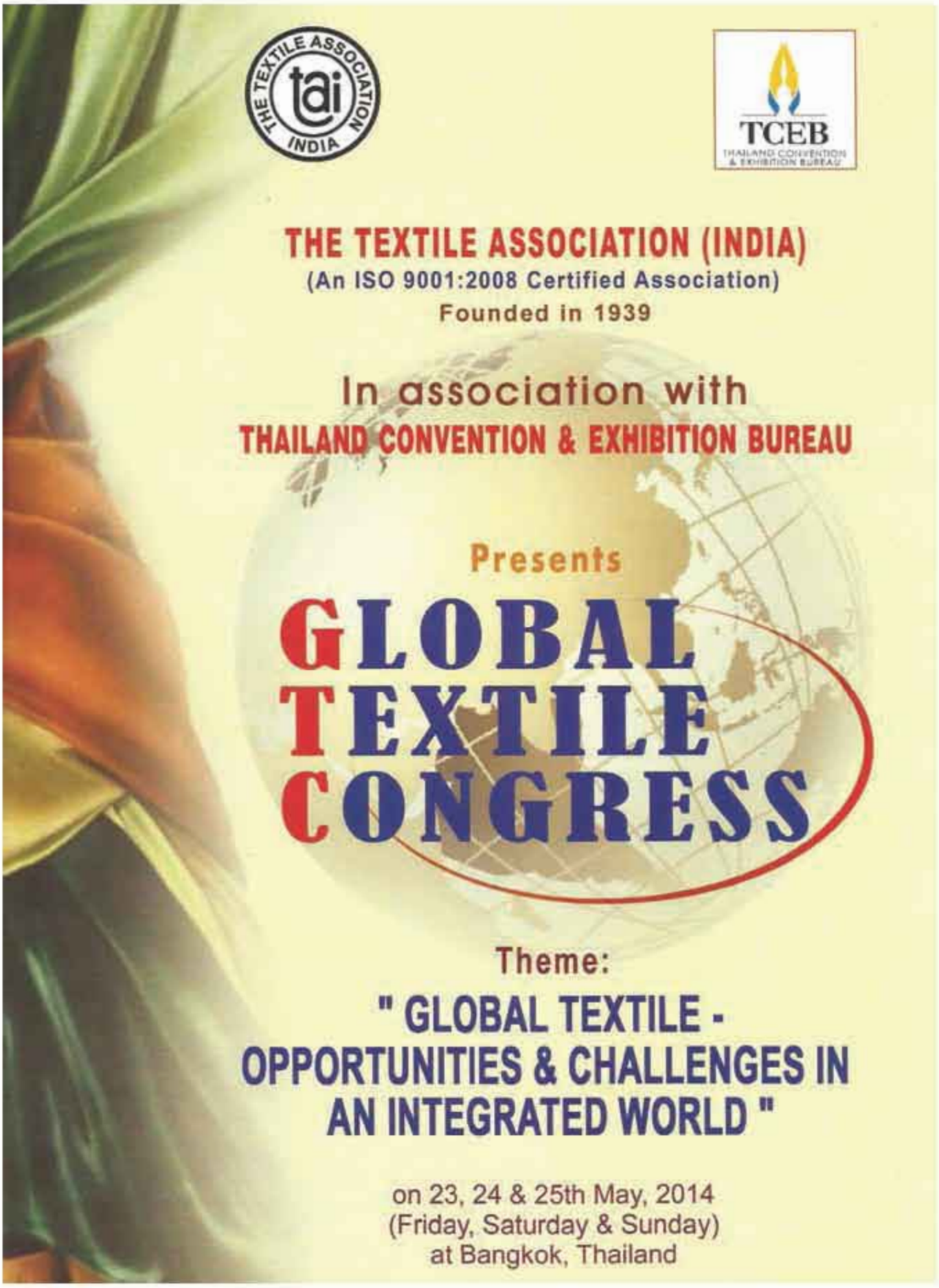

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Journal of the
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TEXTILE SCIENCE | TECHNOLOGY | ENGINEERING | MANAGEMENT

ISSN 0368-4636

Nov - Dec 2013
Volume 74 No. 4

Contents

Editorial

German Technology meets Indian Textile

The month of December happend to be a month full of enthusiasm not only for a long awaited Christmas vacation, but also a month to take the stock of what we did in full year and what we plan to do in this coming year. In this very month number of events took place; on 3rd December there was a Conference on *German Technology meets Indian Textile* in Mumbai and on 5th December it was repeated in Coimbatore. Then followed the *11th International & 69th All India Textile Conference* which took place on 20th-21st December in Surat. On 27th December the President of India Hon. Shri Pranab Mukherjee visited ICT (Former UDCT Campus) and inaugurated *Chemcon* meet. All these events were dedicated to the enhancement of technological competence of Indian Industry. The month thus came with full of hope and new spirit instilled in the technocrats and decision makers to make concerted efforts in the coming years while generating the wealth for the nation.

Personally being invited to moderate the full day seminar on behalf of VDMA-the German Textile Machinery Association, it was my privilege to look at German textile machinery for the production of garment, home textiles and technical textiles in this conference and B2B (Business to Business) matchmaking. It is well recognised that India is poised for significant growth in technical textiles with annual rate of 10-12 % for next 5 years. The capacity of Indian manufacturers of speciality fabrics is thus required to be augmented. The high standard machinery has to be installed to enhance the competitiveness by increasing the production efficiency, by improving the quality of manufacturer's fabric and by saving the energy and materials in the production process.

The session which was devoted to *Knitting: Production, Finishing and Dyeing* had in all 8 presentations. For increasing the productivity of circular knitting machines, the presentation made on behalf of *Groz-Beckert* elaborated the developments in industrial needles, precision parts and fine tools in order to raise the productivity of circular knitting machines. *Mayer & Cie's* presentation described high productive single & double jersey machines and interlocking machines.The productivity of a single machine per day was put interms of being able to clothe 500 Cricket teams. *Mors Maschinenfabrik's* presentation described the machines required for graded compression stocking of Class 1, 2 and 3 which are recommended for medical clothing. Many of the participants showed tremendous interest in these presentations and as they were addressing the needs of sports

textiles and medical textiles. Conditioning and heat setting machines for high quality knitting were offered by *Welker Spintech* which are capable of handling yarn, fabric and technical textiles. *Mahlo's* presentation described the various automation and control process devices for weight, moisture, thickness, weft straightening and product inspection. *Bruckner Textile Technologies* described smart energy transfer system by creating synergy between energy requirements of dyeing and finishing department for enhanced quality and improved performance. Stenters, relaxation dryer, finishing lines for technical textiles, universal coating machines and bonding & finishing lines for nonwoven are their offerings. *Thies* presentation was based on economical and environmental friendly processing which offered the equipments for yarn and fabric dyeing, bleaching & drying plants and various dissolving/dosing system. Then followed the plenary session wherein *Dr. Jean-Pierre Haug* of *Oeko-Tex* introduced STeP which is a new certification system for sustainable production. It is important that the products wanted by consumers are not only high quality and harmless to health, but they need to be environment friendly and produced in responsible way. Then followed a presentation by the representative of *Landesbank Baden-Wurttemberg* which dealt with trade and export finance solutions for Indian importers and German exporters in the textile industry. Finally a panel discussion deliberated on how to upgrade textile business with German technology. Held in Vivanta by Taj-President, Mumbai the conference was well attended by about 200 participants. In general everyone was unanimous with the fact that German textile machines in the segment described is the best in terms of robustness, production efficiency and defect free life with high product quality. However, they are relatively expensive and many a time there are difficulties in procuring spare parts and required after sales service. The message was clear that provided these concerns are addressed there is no doubt the Indian textile industrialists will choose to prefer the German textile machinery.

So friends while we say Good bye to 2013, we welcome with open arms the New Year 2014.On behalf of the Editorial Board, the Editor and my personal behalf, I take this oppportunity to Wish you all, a very prosperous and Happy New Year 2014.

Prof. (Dr.) Mangesh D. Teli,
Chairman,Editorial Board, JTA

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Design Modification in Electrical Warp Stop Mechanism and its Effects

S. V. Koravi* & S. G. Kulkarni
Dept. of Textile Technology, DKTE's Textile and Engineering Institute.

Abstract
In modern weaving industry one of the most frequent facing problems is breakages of warp yarns which not only reduce the production rate but also deteriorate the quality of the produced fabric. The main function of the warp stop motion is to stop the weaving process, in a very short period, when a warp yarn breaks. It is very difficult to identify the location and repair the broken warp yarns from several thousand warp yarns on single weaving machine. It is one of the largest time consuming and laborious tasks in weaving. Thus by reducing these breakages of warp yarns, there is an increase in the productivity of the processes involved in the production of fabric including warping, sizing etc. The quality of the fabric is also improved. This also reduces yarn wastages and energy, ultimately reducing the cost per meter of the fabric. Also it is possible to minimize the time required for locating the position of broken warp yarns on loom with SID (Section Indicating Device) attachment to electrical warp stop mechanism.

Key Word
Weaving, Warp yarn, Breakage, Warp Stop motion, Warp Yarn Breakages, SID.

1. Introduction

High speed shuttleless looms are always emphasized to increase production and maintain quality of woven fabrics to meet the demands of both national and international quality familiar to consumers and markets. Also, competitiveness is the main feature of the textile industry in future. In weaving industry one of the most frequent facing problems is breakages of both warp and weft yarns which not only reduce the production rate but also deteriorate the quality of the produced fabric. In warp mending procedure, there are two main operations taking place; one is searching of broken warp ends and second one is mending or knotting of broken warp ends. Searching of broken warp end is a very tedious & laborious work, it requires skill. If we can reduce the time required for locating the position of broken warp yarns on looms. Then automatically we can increase the machine efficiency & production of loom shed.

1.1 Reasons for Warp Breaks

1.1.1 Warp Yarn Quality

Yarn stoppages, particularly warp yarn stoppages are attributable mainly to raw material quality and/or its preparation for weaving. The selection of the yarn for production of fabric is a very sensitive matter because this selection affects the efficiency of different process for the production of fabric like weft winding, warping and sizing and different loom operations. Ultimately the quality of the produced fabric is influenced by the selection of yarn. The selection of the yarn is done according to the requirements of finished fabric.

1.1.2 Warp Yarn Abrasion Resistance

Yarn quality is generally increased by sizing. A change in breaking force, elongation at break and abrasion resistance due to sizing does not depend only on the sizing conditions, but also on the yarn properties before sizing. In addition to the breaking force, which is very important in the weaving process, it is necessary to emphasize that elongation at break, abrasion resistance etc. largely depend on the fibre and yarn properties, and on the conditions of processing the yarn for weaving. Abrasion resistance of yarn due to sizing increases considerably, but with great deviations, such places sometimes occur on coarser yarns which have a lower abrasion resistance than the yarns before sizing. This investigation aims to stress the importance of optimizing size coat to achieve as high a production as possible in weaving and product quality. It is emphasized that significance and complexity towards the

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standardisation of sizing in order to produce high-grade yarns are very important. It is also important to apply size on the surface of the thread in the form of a film providing outer protection of the threads. It is believed that size coat will enable a minimum end breakage rate on a loom.

1.1.3 Warp Yarn Stresses

The warp threads running from the warp beam all the way to interlacing in a loom come into contact with the back rest roller, the drop wires, the healds and the reed and weft yarn. Yarn forces or stresses occur in the positions where the weft yarn passes from the right side to the left side and vice versa. The failure of sized yarns on a loom is attributed to the cumulative damage caused by cyclic fatigue of relatively small forces combined with abrasion. The failure of warp yarns on a loom is caused by repeated cyclic elongation at small stresses well below the breaking point applied under static load. The phenomenon commonly known as fatigue is caused by the gradually diminishing resistance of the material attributable to cumulative damage.

1.1.4 Warp Yarn Tension

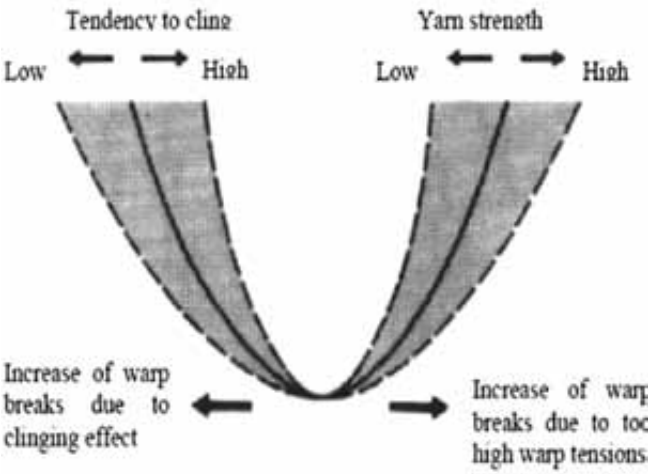

Figure 1.1: Warp tension vs. end breaks curve

Warp tension is the most important cause for end breaks during the formation of woven fabrics. Dr. Weinsdorfer proved that the numbers of end breaks were directly related to warp tension. Low yarn tension creates a clinging effect, resulting in yarn breaks. High yarn tension increases yarn stress resulting also in yarn breaks. The influence of warp tension on machine stops. (As shown in Figure 1.1) An optimum warp tension where end breaks is minimized. The Optimum Warp Tension is an important parameter since it maximizes the weaving efficiency of a machine. This number can be used for initial machine settings for similar fabric patterns and warps. This number can be estimated empirically.

1.2 Monitoring Warp Yarn (Warp Stop Mechanism)

Optical devices were suggested but British companies have already done it. Meinersdel Limited offered an on-line broken filament detector. It uses infra red sensor technology and it can detect individual filaments at the speed of 5000 m/min. The limitation of this solution is the size of the detector: approximately 3 cm for each filament, however, it is a contactless type of detection. Although it is not commercialized as it is, the fundamental research has been done [8]. This sensor is for filament formation more than for use as warp stop motion detection in weaving.

1.3 Broken Warp Thread Locator

Dewaele S. has conducted the research study on "Broken Warp Thread Locator", The location of a warp thread break in a weaving loom using electrically conductive drop wires bridging an electrode pair upon occurrence of a warp thread break includes applying opposing known voltages across opposite ends of the electrode pair, establishing current circuits including the voltage sources, the electrode pair and a fallen drop wire, and determining the distance between one end of the electrode pair and the fallen drop wire by calculations using known values corresponding with the voltages and measurements of values corresponding to the current values in the current circuits [2]. A system for carrying out the method includes electrode pairs having a detectible resistance, conductive drop wires, voltage sources connected to the electrode pairs, current detecting/measuring devices, computerized calculating system, warp break location indicators and connecting circuit elements.

1.4 Electronic Laser Warp Stop Motion Device

Gahide S., carried out the research study on, "Electronic Laser Warp Stop Motion Device", Electronic warp stop motion device, of the type where in the breaking of a warp yarn, causing the dropping of a corresponding lamina, interrupts a luminous beam between the sending part and the receiving part of one of a plurality of photoelectric cells, provided to each control a corresponding row of warp yarns, to have said breakages signaled and to stop the loom. The photoelectric cells of said device use beams of coherent light produced by a laser source [10].

2 Material & Method

2.1 Material

2.1.1 Material for Fabrication

Following electrical & electronic materials were used for the circuit fabrication purpose,

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c) 2k Resistance - 03 Nos.i) LED Red Color -07Nos.
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e) Wp. stop Bar (20 to 25 "each) -03 Nos
k) Supporting Bracket - 02 Nos.
f) Bar Connectors - 02 Nos.l) E- Drop Pins - Open / Closed

2.1.2 Material for Trail

Fabric quality/sort 63/84x88/60x60 plain weave

63" Grey fabric width, 84 EPI x 88 PPI, 60s warp count x 60s weft count.

60s warp count of 100% cotton, combed & sized spun yarns were taken for this study

2.2 Method

2.2.1 Working Principle of Section Indicating Device

Each warp stop bar (row) was divided into number of sections, the length of each section is 20- 25 inches and for each section there was a Section Indicating Device (SID) i.e. LED indicators mounted on warp stop bar. When warp yarn breaks, electrical warp stop mechanism stops the loom, at same time SID gives the row wise and section wise warp breakage indication through LED indicators on loom. It easy to identify the row & section of broken warp yarn on loom with help of SID i.e. LED indicators. After warp break, there are two operations taking place; one is identifying the location of broken warp yarn on loom and second is to mend the broken warp yarn and start the loom.

The time required for locating the position of broken warp yarns is calculated by the time between 1st drop pin touched to identify for broken warp yarn on loom by the weaver. The in-between time is called the time required for locating the position of each broken warp yarn on loom.

We did the study on the previously said fabric quality to calculate the average time required for locating the position of broken warp yarns on loom with and without design modification in electrical warp stop mechanism . Further more details are shown in Figures 2.1 - 2.4.

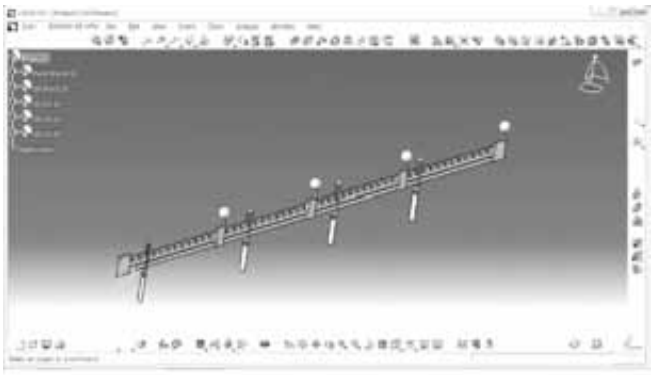


Figure 2.1: 3D View

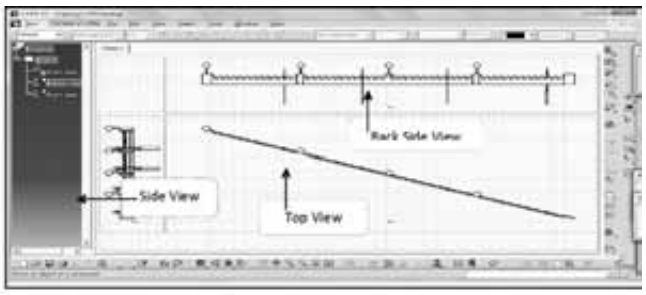


Figure 2.2: Graphical View

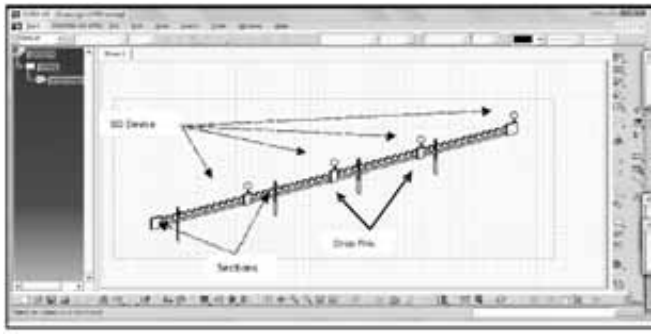


Figure 2.3: Isometric View

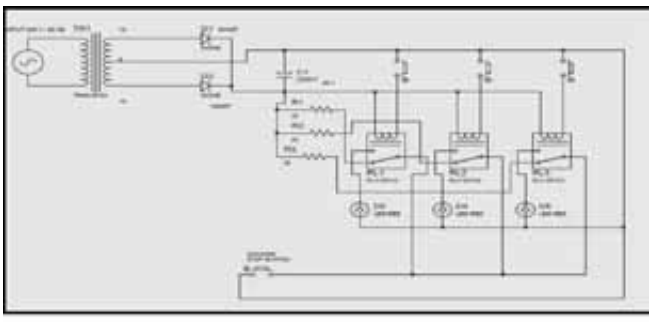


Figure 2.4: Electrical circuit Diagram

2.3 Machine

2.3.1 Without SID attachment to electrical warp stop mechanism

The study was carried on 63 inches width loom, the trail was carried on the said fabric quality to find out

the time required for locating the position of broken warp yarns on electrical warp stop mechanism i.e. without SID attachment. In this case, weaver has to search all the warp ends to locate the position of broken warp yarn manually. The weaver has to do this same procedure for every warp break.

2.3.2 With SID attachment (Design Modified) on Electrical Warp stop Mechanism

The study was carried out on 63 inches protocol device with Design modified electrical warp stop mechanism. Each row was divided into number of sections and each section was attached with SID. In this case, weaver has to search a particular section and not all warp ends at every warp break on loom. With help of SID attachment, the broken warp yarns' section can be easily identified with help of LED indicator by weaver. So it minimizes the time required for locating the position of each broken warp yarns on loom.

3 Results & Discussion

3.1 Loom Speed vs. Warp Breakage rate

The study was carried on 63 inches Air jet Loom for the above said fabric quality with different Airjet loom speeds. After analyzing the warp breakage data, it was found that as loom speed increases the warp breakage rate also increases on loom, that means the loom speed is directly proportional to warp breakage rate. (See Figure 3.1)

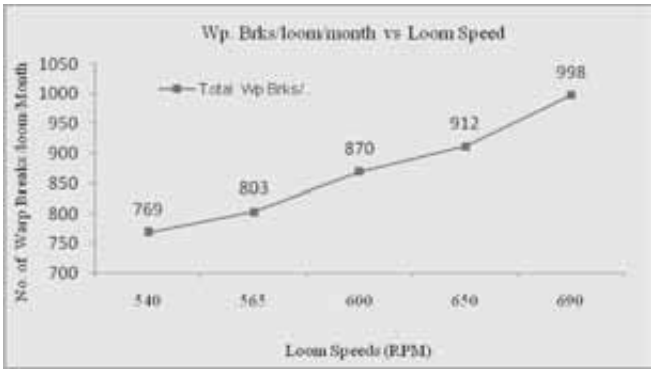


Figure 3.1: Warp breaks/loom/month Vs Loom speed

3.2 Time Study on Different Width Looms

3.2.1 Without SID attachment to Electrical Warp Stops Mechanism

In this case, there was no attachment of section indicating device (SID) to warp stop bar (row) of electrical warp stop mechanism. When warp yarn breaks, electrical warp stop mechanism stops the loom, for locating the position of broken warp yarns, weaver has to search the entire warp end containing drop pin manually. The study was carried out to find the time required for locating the position of broken warp yarn on without SID attachment to electrical warp stop mechanism. We have taken 100 warp yarn breakage readings on 63, 130 & 153 inches loom width and study was carried out under the standard working condition (RH 75-80%). Detailed explanations are given in Tables 3.1, 3.2, 3.3 & Figures 3.2, 3.3, 3.4.

Table 3.1: Time study on 63 inches loom width (Without SID attachment)

Sr. No.	Time Required for locating the Position of Broken Warp Yarns on 63 inches Loom width (Sec.)										
1	9	15	15	20	10	11	12	13	12	7	
2	15	13	8	15	13	9	9	12	15	15	
3	14	11	12	11	11	8	13	18	14	23	
4	11	12	9	15	16	9	8	12	9	15	
5	7	15	13	12	9	15	15	18	4	13	
6	11	9	15	14	15	14	12	21	15	12	Min.
7	12	15	19	3	20	12	14	15	13	18	3
8	15	8	18	14	12	14	19	9	12	14	Max.
9	18	12	15	18	8	15	12	14	9	12	23
10	12	13	8	15	13	11	14	8	15	5	Avg.
Avg.	**12**	**12**	**13**	**14**	**13**	**12**	**13**	**14**	**12**	**13**	**12**

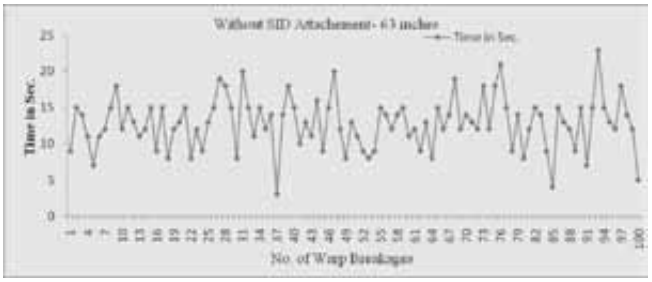


Figure 3.2: Time Vs number of warp breakages, without SID on a 63 inches loom

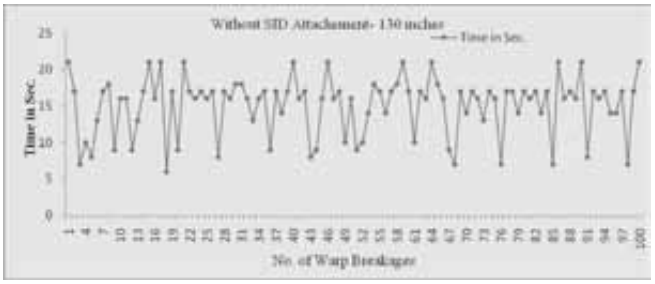


Figure 3.3: Time Vs number of warp breakages, without SID on a 103 inches loom

Table 3.2: Time study on 130 inches loom width (Without SID Attachment)

Sr. No.	The Time Required for locating the Position of Broken Warp Yarns on 130 inches Loom width (Sec.)										
1	21	16	21	18	16	9	10	17	16	8	
2	17	9	17	16	17	10	17	16	17	17	
3	7	13	16	13	8	14	16	13	14	16	
4	10	17	17	16	9	18	21	17	17	17	
5	8	21	16	17	16	17	18	16	7	14	
6	13	16	17	9	21	14	16	7	21	14	Min
7	17	21	8	17	16	17	9	17	16	17	6
8	18	6	17	14	17	18	7	17	17	7	Max
9	9	17	16	17	10	21	17	14	16	17	21
10	16	9	18	21	16	17	14	17	21	21	Avg.
Avg.	**14**	**15**	**16**	**16**	**15**	**15**	**15**	**15**	**15**	**15**	**15**

Table 3.3: Time study on 153 inches loom width (Without SID Attachment)

Sr. No.	The Time Required for locating the Position of Broken Warp Yarns on 153 inches loom width (Sec.)										
1	20	17	18	16	13	5	21	14	13	21	
2	9	14	17	17	14	13	9	4	17	20	
3	17	9	14	12	5	15	14	22	25	17	
4	12	21	9	17	20	32	17	6	21	20	
5	18	17	14	7	21	17	20	20	15	9	
6	17	9	17	15	17	9	21	15	28	21	Min.
7	9	17	15	17	23	21	15	17	14	17	4
8	17	15	28	15	21	8	17	21	7	15	Max.
9	15	21	6	21	15	17	21	15	21	8	32
10	21	18	15	17	14	22	15	17	8	17	Avg.
Avg.	**17**	**15**	**15**	**15**	**16**	**16**	**17**	**16**	**17**	**16**	**17**

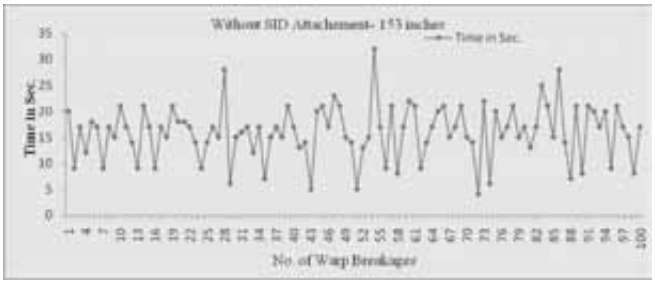


Figure 3.4: Time Vs number of warp breakages, without SID on a 153 inches loom

3.2.2 With SID attachment to Electrical Warp Stops Mechanism

In this case, attachment of SID to warp stop bar (row) of electrical warp stop mechanism, when warp yarn breaks electrical warp stop mechanism stops the loom at same time section indicating light blows & it gives the indicate the location of broken warp yarn from which rows & sections. So it very easy for locating the position of broken warp yarns, with help of SID attachment electrical warp stop mechanism. Directly weaver has to search the particular row with particular section. Weaver has not to search the all warp yarns at every warp break or warp stop. We have carried out the study to find the time required for locating the position of broken warp yarn on with SID attachment to electrical warp stop mechanism. We have taken 100 warp yarn breakage reading on 63,130 & 153 inches loom width & study was carried out under the standard working condition (RH 75-80%). For more detail see the Tables 3.4, 3.5, 3.6 & Graphs 3.5, 3.6, 3.7.

Table 3.4: Time Study on 63 inches Loom Width (with SID attachment)

Sr. No.	**The Time Required for locating the Position of Broken Warp Yarns on 63 inches Loom Width (Time Sec.)**										
1	4	3	4	2	2	3	3	3	3	4	
2	2	3	4	4	3	2	4	2	4	2	
3	3	4	2	4	3	2	3	3	2	3	
4	3	2	4	4	2	4	3	4	2	4	
5	1	4	3	3	1	2	2	3	1	3	
6	2	3	3	2	3	2	4	2	3	4	Min.
7	4	3	4	3	3	1	2	4	3	2	1
8	3	4	3	4	3	4	2	2	2	4	Max.
9	4	2	3	2	4	3	2	4	2	2	4
10	2	3	4	3	3	4	4	3	3	4	Avg.
Avg.	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Table 3.5: Time Study on 130 inches Loom Width (with SID attachment)

Sr. No.	**The Time Required for locating the Position of Broken Warp Yarns on 130 inches Loom Width (Time Sec.)**										
1	3	2	3	4	4	2	3	4	4	2	
2	4	2	4	3	2	4	2	4	4	4	
3	4	4	3	4	4	4	4	2	4	3	
4	3	2	3	4	4	4	3	4	3	3	
5	3	3	4	4	2	3	4	2	4	3	
6	2	4	3	3	3	4	2	3	3	4	Min.
7	2	3	4	4	4	2	4	2	4	3	2
8	2	2	4	4	2	3	4	2	3	4	Max.
9	4	3	2	3	4	2	2	4	2	2	4
10	3	3	3	4	3	2	3	3	2	3	Overall Avg.
Avg.	**3**	**3**	**3**	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Figure 3.5: Time Vs number of warp breakages, with SID on a 63 inches loom

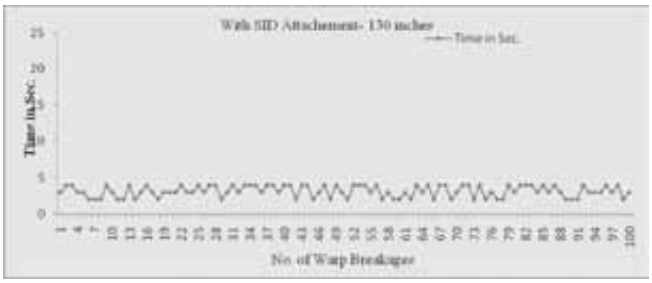


Figure 3.6: Time Vs number of warp breakages, with SID on a 130 inches loom

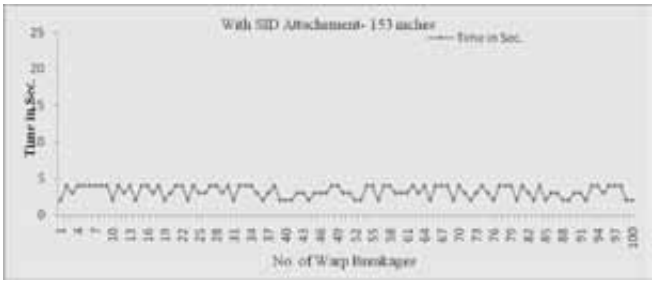


Figure 3.7: Time Vs number of warp breakages, with SID on a 153 inches loom

3.2.3 Comparative Time Study between with & without SID attachment to electrical warp stop mechanism

We carried out the study for the Avg. time required for locating the position of broken warp yarns on three different looms width, with & without SID attachment electrical warps stop mechanism, the avg. time in second was calculated from avg. of 100 warp breakage readings & Statistical analysis (t-test: two- sample assuming unequal variances) between with & without SID attachment to electrical warp stop mechanism to evaluate the average time required for locating the position of broken warp yarns on 63,130 & 153 inches loom width. The average time required for locating the position of broken warp yarns on 63, 130 & 153 inches loom widths with and without SID attachment to the electrical warp stop mechanism are 03, 03 & 03 sec. and 12, 15 & 17 sec. respectively. After analysis, we found that there is a statistically significant difference between t-Stat and t-Critical, that means there is a significant difference between with & without SID attachment for the time required for locating the position of broken warp yarns on electrical warp stops mechanism. In 63 inches loom widths we can save time upto 09 seconds, in 130 inches loom width we can save time upto 12 seconds & in 153 inches loom width we can save time upto 14 seconds for each warp yarn beark on loom. More detail see in Table 3.7 & Figure 3.8.

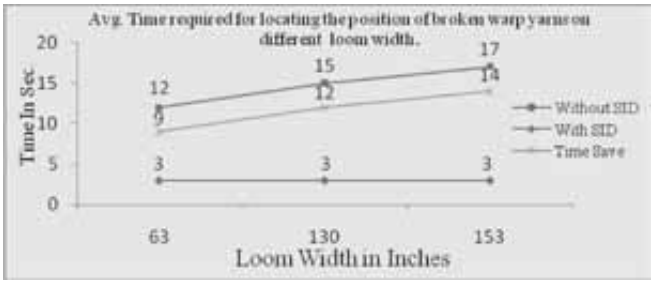
Table 3.6: Time Study on 153 inches Loom Width (with SID attachment)

Sr. No.	The Time Required for locating the Position of Broken Warp Yarns on 153 inches Loom Width (Time Sec.)										
1	2	4	4	2	2	3	3	3	4	3	
2	4	3	4	4	3	2	4	2	3	2	
3	3	4	2	4	3	2	3	3	2	4	
4	4	2	4	4	2	4	4	4	4	4	
5	4	4	3	3	3	4	2	3	2	3	
6	4	4	3	2	3	2	4	2	3	4	Min.
7	4	3	4	3	3	4	4	4	3	4	2
8	4	4	4	4	4	4	4	4	2	4	Max.
9	4	2	3	2	4	3	2	4	2	2	4
10	2	3	4	2	3	3	4	2	3	2	Overall Avg.
Avg.	**4**	**3**	**4**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Table 3.7 Time Study for Different Loom Width with & without SID attachment

Sr. No.	Width (Inches)	Avg. Time Required for Locating the Position of Broken Warp Yarns (Sec.)		Time save / Brk. in (sec.)
		Without SID Attachment	With SID Attachment	
1	63	12	3	9
2	130	15	3	12
3	153	17	3	14

Figure 3.8 Avg Time required for locating the position of broken warp yarns on different loom width



Total Time Save in Second per day per loom = Total No. of warp breaks per day per Loom X 09 Sec. (Time Diff.) X Total No. Looms (63inches).

Table 3.8 : Time Study for with & without SID attachment on 63 inches Loom Width

Days	L No.	Quality	Speed RPM	No. Wp. Brks/ Day	Without SID (Time required in Sec.)	With SID (Time required in Sec.)	Save (Time in Sec.)
1	1	63/84x88/60x60	710	30	360	90	270
2	1	63/84x88/60x60	710	58	696	174	522
3	1	63/84x88/60x60	710	73	876	219	657
4	1	63/84x88/60x60	710	39	468	117	351
5	1	63/84x88/60x60	710	71	852	213	639
6	1	63/84x88/60x60	710	46	552	138	414
7	1	63/84x88/60x60	710	44	528	132	396
8	1	63/84x88/60x60	710	42	504	126	378
9	1	63/84x88/60x60	710	47	564	141	423
10	1	63/84x88/60x60	710	70	840	210	630
11	1	63/84x88/60x60	710	34	408	102	306
12	1	63/84x88/60x60	710	42	504	126	378
13	1	63/84x88/60x60	710	18	216	54	162
14	1	63/84x88/60x60	710	30	360	90	270
15	1	63/84x88/60x60	710	83	996	249	747
16	1	63/84x88/60x60	710	28	336	84	252
17	1	63/84x88/60x60	710	85	1020	255	765
18	1	63/84x88/60x60	710	57	684	171	513
19	1	63/84x88/60x60	710	57	684	171	513
20	1	63/84x88/60x60	710	51	612	153	459
21	1	63/84x88/60x60	710	47	564	141	423
22	1	63/84x88/60x60	710	41	492	123	369
23	1	63/84x88/60x60	710	33	396	99	297
24	1	63/84x88/60x60	710	30	360	90	270
25	1	63/84x88/60x60	710	33	396	99	297
26	1	63/84x88/60x60	710	42	504	126	378
		Time in Sec.			14772	3693	11079
		Time in Min.			246	62	185

3.3 Study of No. of Warp Breakages per Day and Time saving for locating the position of broken warp yarns on loom

We carried out the study on number of warp breakages rates per day for the Fabric Quality 63/84x88/ 60x60, considering & maintaining the Man, Machine & Material for the production on Airjet loom, the machine speed of 710 rpm and maintained the standard atmospheric conditions (R.H.) during production for 26 days. The detail observations are given in Table No. 3.8, Figures 3.9 & 3.10. The average warp breaks per day per loom for the above said fabric quality was 48 warp breaks/ day/ loom and Total No. of warp breaks per month per loom was 1231 warp breaks. The maximum No. warp breaks per day per loom: 85 & minimum No. warp breaks per day per loom: 18.

We carried the study on 63 inches loom width, the avg. time difference for locating the position of broken warp yarns on 63 inches loom width, with & without SID attachment to electrical warp stop mechanism was 09 second. That means we can save on an average 09 second per warp break for locating the position of broken warp yarn with help of SID attachment to electrical warp stop mechanism. Considering this, we can calculate the total time save in second per day per loom.

Figure 3.9 : Warp Breakages per Day on 63 inches Loom

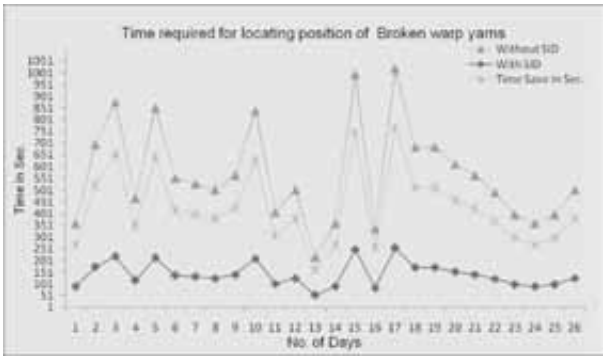


Figure 3.10 : Time Study for with & without SID attachment on 63 inches Loom

In this case weaver has to search a particular section not all warp ends at every warp break on loom. With help of SID attachment the broken warp yarns section can be easily identified by weaver, directly it minimizes the time required for the locating the position of each broken warp yarns on loom.

4. Conclusion

In the above observation, we can save up to 75 % of time for each warp break for locating the position of broken warp yarn with SID attachment to electrical warp stop mechanism than without SID attachment on loom. Also On wider width loom we can save more than 75% of time warp break for locating the position of broken warp yarn with SID attachment to electrical warp stop mechanism than without SID attachment on loom. We can reduce the loom down time due to warp stoppages. It means increases the production, machine efficiency & shed efficiency. Weaver movements on loom for location the position of broken warp yarns also reduces / minimized with SID attachment to electrical warp stop mechanism.

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❑ ❑ ❑

Textsmile

A: John says I'm pretty. Andy says I'm ugly. What do you think, Peter?
B: I think you are pretty ugly

Flower Waste from Temple for Dyeing of Cotton and Cotton/Silk

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Abstract
Due to the result of stringent environmental standards imposed by many countries in response to toxic and allergic reactions associated with synthetic dyes, alternative colourants are being tried out. The consciousness of possible risks during manufacturing of synthetic dyes which involve use of petrochemical based raw materials and the hazardous chemical reactions is also increasing for their synthesis; the use of natural dyes has been growing rapidly. Thus, natural dyes, which were not in market some decades ago are recently gaining importance due to the increased consumer interests. India has a rich biodiversity and a wealth of useful resources and there is no doubt that the plant kingdom can be utilized as a treasure-house of diverse natural colourants. Several attempts are made by the scientists throughout the world to isolate natural dyes from different vegetables and flowers. Here, in this study an attempt has been made to isolate natural dyes from the flowers of Hibiscus and Marigold and apply them on cotton and cotton/silk blended fabric, with the help of different mordants like alum, harda and ferrous sulphate. The dyed fabrics were subjected for colour measurements and their fastness properties were checked. The results indicate a very strong potential of use of such natural resources for colouration of cotton and cotton/silk blends.

Keywords
Natural dyes, Hibiscus, Mordant, Marigold, Pulverize

1. Introduction

India has a rich biodiversity and it is not only one of the world's twelve mega diversity countries but also one of the eight major centers of origin and diversification of domesticated taxa. It has approximately 4, 90, 000 plant species of which about 17,500 are Angiosperms; more than 400 are domesticated crop species and almost an equal number of their wild relatives [1, 2]. Research has shown that some of the synthetic dyes are suspected to release harmful chemicals that are allergic, carcinogenic and detrimental to human health. On the other hand, natural dyes are environment-friendly; for example, turmeric, the brightest of naturally occurring yellow dye is a powerful antiseptic which revitalizes the skin, while indigo gives a cooling sensation. Though, dyes have been discovered accidentally, their use has become so much a part of mans customs that it is difficult to imagine a modern world without dyes [3].

Natural dyes are dyes or colourants derived from plants, insects or minerals. The majority of natural dyes are vegetable dyes from plant sources like roots, berries, bark, leaves, and wood. Some of the natural dyes are obtained from insects or other organic sources such as fungi and lichens. India is the home to more than 500 flowering plants that can yield dyes. These flowers are used for decoration purposes and for offering to God. A survey report reveals that 40% of the total productions of flowers are unsold and wasted everyday which are thrown in river water or dumped which also creates water pollution as well as environmental pollution. These wasted flowers can be used in various ways and we can get wealth from waste materials.

Recently, a number of commercial dyers and small textile export houses have started looking at the possibilities of using natural dyes on regular basis for dyeing and printing of textiles to overcome environmental pollution caused by the synthetic dyes [4]. Natural dyes produce very uncommon, soothing and soft shades as compared to that of synthetic dyes.

Marigold flower [*Tagetes erecta L.*] is a major source of cartenoids and Lutein and is grown as a cut flower and for its medicinal values. Marigold flowers [Tagetes], which are yellow to orange, are a rich source of lutein, a carotenoid pigment. Nowadays, Lutein is becoming

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an increasingly popular active ingredient used in the Food Industry and Textile colouration. This pigment has acquired greater significance because of its excellent value. Although marigold flower extract has been used in veterinary feeds, the potential use of marigold as a natural textile colourant has not been exploited to its full extent. This is due to the lack of information on its safety, stability, and compatibility in textile colouration. In this paper, results of the study of using the extract obtained from marigold flower in different forms like dry, pulverized and fresh, as a natural dye are discussed. The potential of the extract was evaluated by dyeing 100% cotton fabrics under normal dyeing conditions [5] and on cotton silk blend fabric.

The other natural dye reported in this paper is from Hibiscus flowers. These plants are abundantly available in India and the Pacific Islands. Hibiscus flowers are white and pink in colour, both magnificent plants, exhibiting large flowers about 5 inches in diameter, beautiful and bold. Hibiscus flowers usually only last for one day, opening in the morning and wilting late afternoon. Hibiscus plants grow tall, and are best planted around the border. They need no further care after being transplanted and then follow cutting-off the flower stem when flowering is over. Some of this flowers although give pleasant smell but the vast majority has no fragrance at all [6].

2. Materials and Methods

Cotton (100%) and cotton/silk blend fabric was purchased from Piyush Syndicate, Mumbai. All chemicals used were of laboratory grade and were purchased from S.D. Fine chemicals ltd. Mumbai. Floral dyes were supplied by Adiv Pure natural, Mumbai.

2.1. Materials

Substrates used were Cotton (80 GSM), cotton/silk of 50/50 blend ratio (30 GSM), Mordants used were alum, harada and $FeSO_4$, Dyes sources selected were marigold and hibiscus flowers.

2.2. Methods

2.2.1 Extraction of Myrobolan (Harada) Mordant

A 10% stock solution of Myrobolan was prepared by boiling 10gm of dry powder in 100ml of water for 60 min. The extract was filtered, made to 100ml and used for dyeing.

2.2.2 Extraction of Marigold dye

A 10% stock solution of marigold dye was prepared by boiling 10gm of fresh petals, dry petals and dry pulverized powder of petals each separately in 100ml of water for 60 min. The extract was filtered; volume was made up to 100 ml and used for dyeing.

2.2.3 Extraction of Hibiscus dye

A 10% stock solution of Hibiscus dye was prepared by boiling 10gm of dry pulverized powder in 100ml of water for 60 min. The extract was filtered and volume was made up to 100ml and used for dyeing.

2.2.4 Mordanting and Dyeing process

The mordanting of cotton and cotton/silk fabrics was carried out in Rota dyer machine keeping the material to liquor ratio 1:30. The fabrics were introduced into the mordant solution at room temperature and slowly the temperature was raised to 90^0C for cotton and 70^0C for cotton/silk and the mordanting was continued for 1 hr. After mordanting, the fabrics were squeezed and dyed, using natural dyes (Marigold or Hibiscus). The mordanted fabrics were introduced in dye bath and dyeing was continued at 90^0C for cotton and 70^0C for cotton/silk for 1hr. After dyeing, the fabrics were squeezed and washed with cold water.

3. Testing and Analysis

3.1 Colour value by reflectance method

The dyed samples were evaluated for the depth of colour by reflectance method using 10 degree observer on Rayscan Spectrascan 5100+ equipped with reflectance accessories. The K/S values were determined using expression:

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

Where, R is the reflectance at complete opacity; K is the Absorption coefficient & S is the Scattering coefficient. The dyed fabrics were simultaneously evaluated in terms of CIELAB colour space (L*, a* and b*) values using the Rayscan Spectrascan 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* corresponds to the red-green coordinate (positive- red, negative -green) and b* corresponds to the yellow-blue coordinate (positive -yellow, negative -blue). As a whole, a combination of these entire co-ordinates enables one to understand the tonal variations.

3.2 Evaluation of Wash fastness

Evaluation of colour fastness to washing was carried out using ISO II method. A solution containing 5g/L soap solution was used as the washing liquor. The samples were treated for 45 min at 500C using liquor to material ratio of 50:1 in Rota dyeing 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).

3.3 Evaluation of Light fastness

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

4. Results and discussion

Cotton and cotton/silk samples were dyed with yellow and orange marigold flowers in three different forms i.e. fresh, dry and pulverized form. Depths of shades of all the three samples of marigold were studied using K/S values obtained using computer colour matching.

From Table 4.1 it is clearly seen that the K/S values for dyed pure cotton and cotton/silk sample with dry marigold flower are more than those for pulverized and fresh marigold flower. When fresh marigold flowers petals were used to extract dye the colour yield obtained was least whereas in pulverized powder of dry petals it was slightly higher. However dry petals gave the highest colour yield as the K/S values obtained on the fabric were maximum. It is noted that while preparing dry extracts, petals were weighed and since equal weight of petals (fresh, dry powder) were taken, due to high water content in the fresh flower petals, the resultant actual weight of petals carrying the pigment was obviously less and thus, the shade obtained will be least in this case. In pulverized powder form, it seems the colouring pigment being extracted by water is much less; as other ingredients in the petal powder must be competing to get into solution due to highest surface area of pulverized petals. In dry petals state, only the colour, on boiling with water is extracted and hence extraction extent is maximum. Results in Table 4.2 indicate that the trend remained same in case of cotton silk dyeing with both types of marigold flowers as was observed in the earlier case while dyeing with cotton. However, clearly here the hue differs as it was combination of dye-fibre-mordant which decides the final hue and K/S values. However, on cotton/silk, the respective K/S values were lower than those observed on cotton. The depth of colour obtained from different flowers of marigold i.e. orange marigold and yellow marigold were found to be good enough for use, but the depth and value obtained in case of orange marigold dyed fabric was higher than that obtained using yellow marigold. This is because of the higher tinctorial value of the colour obtained using orange flowers; as compared to that when yellow flowers were used.

Different mordant were used for getting proper depth of shades with marigold dye. The best suited mordant for marigold was found to be Alum. It gave bright yellow hues with very high b* values as compared to other mordants. The $FeSO_4$ mordant gave grayish shade with marigold which is reflected in highest K/S values and least of L*, a* and b* values, indicating deepening of shade with grayish hue.

Table 4.1: K/S value report of cotton samples dyed with different types of Marigold

Sr. No.	Name		Fresh Marigold Orange (20%)				Fresh Marigold Yellow (20%)				Wash Fastness	Light Fastness
			L*	a *	b *	K/S	L*	a *	b *	K/S	Rating	
1	No mordant	FM+	89.067	-1.22	11.106	1.4274	88.904	-0.95	11.1	1.1409	2	3
		PM++	89.58	-1.02	11.214	2.1749	89.518	-1.08	11.06	2.0432	2	3
		DM+++	90.611	-1.49	10.756	2.8273	89.56	-1.18	10.885	2.0237	2	3
2	Alum 20%	FM+	86.311	-0.47	9.092	1.4389	87.464	-0.76	9.648	1.6172	3-4	5
		PM++	91.74	-1.96	17.821	4.6307	90.056	-1.24	15.488	3.0309	3-4	5
		DM+++	92.17	-2.43	18.218	7.9997	90.69	-1.49	16.39	4.6556	3-4	5
3	Harada 20%	FM+	87.331	-0.73	9.615	1.3627	87.216	-0.73	9.608	1.4959	3	5
		PM++	88.1	-0.81	9.852	2.3818	87.64	-0.82	9.451	2.2964	3	5
		DM+++	89.129	-1.38	9.731	3.3385	88.45	-1.12	9.67	2.7202	3	5
4	FeSO4 5%	FM+	82.408	0.736	7.78	1.3947	82.682	0.808	7.582	1.93	3	5
		PM++	83.04	-0.6	7.846	5.0527	82.29	-0.37	7.218	3.2066	3	5
		DM+++	83.019	-0.65	7.8	5.7702	82.19	-0.4	7.227	3.4747	3	5

+FM- Fresh Marigold; ++PM- Pulverized Marigold; +++DM- Dry Marigold

Table 4.2: K/S value report of cotton/silk samples dyed with different types of Marigold

Sr. No.	Name		Fresh Marigold Orange (20%)				Fresh Marigold Yellow (20%)				Wash Fastness	Light Fastness
			L*	a *	b *	K/S	L*	a *	b *	K/S	Rating	
1	No mordant	FM	92.908	-1.88	8.403	0.637	93.656	-2.05	7.941	0.7657	2	3-4
		PM	93.415	-1.78	9.02	1.6595	92.965	-1.72	9.036	1.4979	2	3-4
		DM	93.438	-1.855	8.862	2.1569	92.59	-1.78	8.487	1.5702	2	3-4
2	Alum 20%	FM	93.021	-1.62	11.102	1.2118	93.242	-1.66	10.671	1.4385	3-4	5
		PM	94.165	-2.28	11.861	3.3672	93.929	-2.2	11.556	2.5887	3-4	5
		DM	94.754	-2.546	12.81	3.8707	94.444	-2.397	11.836	2.9758	3-4	5
3	Harada 20%	FM	90.866	-0.95	6.782	1.147	91.239	-1.04	6.163	1.3367	3	5
		PM	91.93	-1.01	6.767	2.2696	91.904	-0.96	6.883	2.0376	3	5
		DM	92.479	-1.284	6.943	2.6213	92.305	-1.03	7.008	1.9673	3	5
4	$FeSO_4$ 5%	FM	88.602	0.07	7.107	0.6895	89.337	-0.12	7.076	0.8829	3	5
		PM	88.463	-0.85	5.731	3.3687	88.671	-0.78	6.072	2.0752	3	5
		DM	89.118	-0.96	6.373	3.616	89.278	-0.968	6.36	2.4573	3	5

+FM- Fresh Marigold; ++PM- Pulverized Marigold; +++DM- Dry Marigold

Table 4.3: K/S value report of cotton and cotton/silk samples dyed with Hibiscus

Sr.No.	Name		Hibiscus (20%)				Wash Fastness	Light Fastness
			L*	a *	b *	K/S	Rating	
1	No mordant	C #	84.998	1.415	10.117	0.7582	2	3
		C/S ##	87.273	4.952	12.485	0.4052	2	3
2	Alum 20%	C #	85.646	0.808	10.749	1.0897	3-4	5
		C/S ##	90.061	0.742	14.339	0.4567	3-4	5
3	Harada 20%	C #	83.742	0.15	8.006	1.3401	3	5
		C/S ##	89.452	0.406	8.344	1.2109	3	5
4	FeSO4 5%	C #	82.328	0.65	7.515	1.3396	3	5
		C/S ##	87.585	2.309	10.836	0.5361	3	5

C- Cotton; ## C/S- cotton/silk blended fabric

Results in Table 3 indicate that the K/S value of the cotton and cotton/silk samples dyed with hibiscus flowers without mordant gave light orange colour whereas with alum mordant light yellow colour shade was obtained. However, Harda and FeSO4 mordants gave greenish shade. The depth of colour values obtained from Hibiscus flower petals was high in cotton than cotton/silk blend. When cotton silk blend was dyed directly with Hibiscus (no mordant was used) it gave light brown colour while with alum mordant it gave bright orange and with Harda and FeSO4 mordant bright brown and greenish hue respectively were obtained.

5. Conclusion

This study has shown that hibiscus and marigold flowers which were obtained as temple waste have good colouration properties. The dry marigold flowers gave better depth of shade than pulverized and fresh marigold flowers. It is also confirmed that alum as metal mordant gave brighter shades with both yellow and orange marigold flowers, while harda and $FeSO_4$ gave darker and duller shades. Compared to yellow marigold flowers, orange flowers gave higher depth of shade. Similarly hibiscus flowers also displayed colouration properties for cotton and cotton/silk blend, giving different shades when varieties of mordants were used. The fastness properties of all these dyeings were found to be well within the accepted limits. Hence, waste flowers of both these types can be used for colouration of cotton and cotton/silk. In other words not only it will solve the problems of treating this waste or pollution control but it can be used for remunerate purpose.

Textsmile

A librarian said to a man asking for a thriller: 'I can recommend you this book. It is a hair-raising story.'
'No use to me,' said the reader, 'I'm bald-headed.

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Studies on Surface Cleaning of Silk Fabrics using Liquid Carbon Dioxide

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Abstract
The preferred method of cleaning silk is by dry-cleaning because silk filaments are more susceptible to breakage when the fabric becomes wet. The most commonly used dry-cleaning solvent, Perchloroethylene (PER), is suspected to be toxic, environmentally harmful and carcinogenic. In order to overcome these environmental problems, it is necessary to find an alternative stain removal method. The present work focuses on analysis of the efficacy of liquid carbon dioxide as an eco friendly stain remover on silk fabrics. For this study, 100% mulberry silk fabric was used. The fabric was dyed using Acid Blue Dye CI-15. Stains used were oil, perspiration, perfume and food stains such as coffee, tea, ice cream etc. Soil removal characteristics were analyzed using detergency performance percentage in terms of Delta E value and K/S measurement from Spectrophotometer. SEM micrographs were used for analysis.

Keywords
Detergency Performance%, Silk fabric, Stain removal, Liquid carbon dioxide, Perchloroethylene

1. Introduction

Silk has always been the sign of royalty due to its gleaming appearance and peach like softness. Silk has various unique properties such as fineness, gloss, handle but it is enfeebled by different stains and poor wash fastness. Silk filaments are more prone to splintering when the fabric becomes damp. They may be tarnished by sun and break from even the gentlest agitation of the washing machine. To protect the life of silk fabrics, dry-cleaning is essential [1].

Staining is major crisis in silk fabrics. It can be removed either by general laundering or dry cleaning. Depending on the nature of the stain, the stain removal method is to be chosen. It is also important that the washing products are environmentally friendly and are biologically degradable. Presently, most of the dry-cleaners use Perchloroethylene (PER), which is toxic, carcinogenic and harmful to environment. There are various problems due to such hazardous chemicals to the environment and the people who are working with these chemicals. In addition, ground contamination by dry cleaning solvents leads to contamination of water systems [2].

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Due to these complications, an alternate to these chemicals are essential by the dry cleaners as well as by the people to wash the delicate fabrics. Research has identified some solvents that equal or exceed perchloroethylene effectiveness in some areas of cleaning. Liquid Carbon dioxide (CO_2) could be an ideal solvent to replace perchloroethylene. Carbon dioxide is non-toxic, non-flammable, ecologically sound and available on a large scale. The removal of non-polar soils in CO_2 is comparable to the level of cleaning in perchloroethylene [3]. An additional advantage of using CO_2 is that the fabrics will dry after washing, because the carbon dioxide evaporates from the fabrics during depressurization of the cleaning-vessel. Therefore, no additional drying step is needed.

In this study, Silk fabric is subjected to different stains in order to analyse the removability of stain ensuing in positive results.

2. Materials and methods

The fabric used in this study is 100% mulberry silk fabric with 55 GSM, 71 ends per inch, 96 picks per inch. The silk fabric is dyed with acid blue CI 15 dye. Different stains used in this study are oil, perfume, perspiration and food stains (coffee, ice cream).

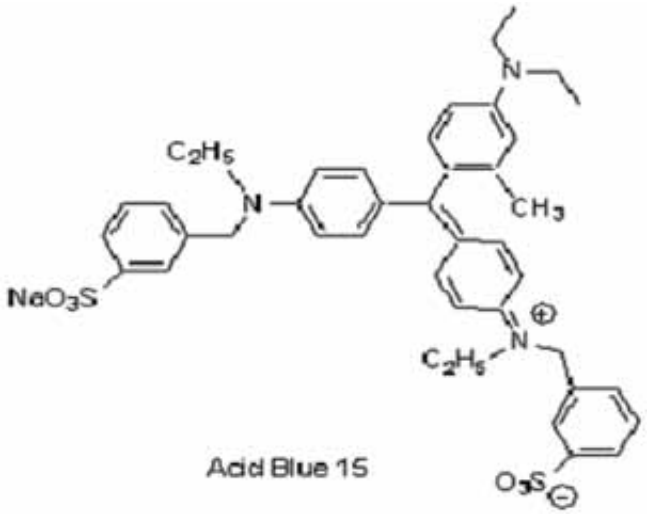

Figure 2.1: Chemical structure of Acid Blue CI 15

2.1. Soiling Procedure

The stains selected for this study are oil, perspiration, perfume and food stain are the stains which requires special treatment on silk fabrics. AATCC Test Method 130 is followed to stain onto the fabric sample by adding five drops of stain solution (Motor oil, coffee, ice-cream). The coffee (50g/l) is cooked in water and used without sugar and milk. Perfume is sprayed 2 to 3 times upright 15 cm away from the silk fabric. The sample is cut at 100 X 100 mm is used for testing with the above procedure. Perspiration tester is used to stain fabric samples with standard perspiration solution (acid / alkaline). It is assessed according to IS 971-1983. The sample is cut in 100mm X 40 mm.

2.2. Stain Removal Procedure

The experimental set-up is shown schematically in Figure 2.2. A rotating vessel is mounted inside the cleaning-vessel to provide mechanical action. This inner-drum is perforated and connected to a rotating shaft.

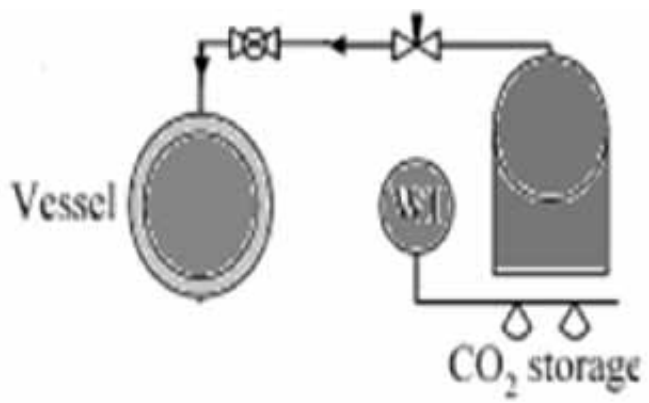

Figure 2.2: Experimental set up

Before the fluid from the vessel enters the pump, it passes through a filter, in order to remove particles, threads, etc. During each cycle of circulation, the CO_2 passes through a heat exchanger. The pressure in the closed CO_2 circulation is allowed to increase or decrease. The set-up was operated with liquid CO_2 at a temperature of 15-20^{0}C and a pressure of 51-55 bar. After cleaning, the wash load is rinsed with pure carbon dioxide for 10 min.

2.3. Evaluation of Detergency Performance (%)

The reflectance measurement was conducted using a colorimetric spectrophotometer (Gretag Macbeth). The colour change of pre-washed and post-washed swatches can be quantified by the reflectance parameter or K/S values [4]. The colorimeter was calibrated against standard black and white plates before each actual measurement and measurements were taken at a minimum of 3 different positions for each sample. The detergency performance was quantified in terms of the percentage of detergency (D %) by using the following equation:

$$\text{Detergency}(\%)=[(A-B)/(C_0-B)\ ]X100$$

Reflectance measurements of the unsoiled swatches (Co), the pre-wash soiled swatches (B), and the post-wash soiled swatches (A) were taken using Colorimetric spectrophotometer [5].

3. Results and discussion

3.1. Color fastness testing

For acid dyed silk fabric, the assessment of colour fastness was done before conducting stain removal study. The result of changes in colour and staining are listed in the Table 3.1.

Table 3.1: Colour fastness results of silk fabric

Sr. No.	Colour fastness	Colour change	Colour staining
1.	Washing	3	4.5
2.	Perspiration	4	4.5
3.	Dry cleaning	4	4

From the assessment of Table 3.1, in case of colour change, from the grey scale value it can be said that the colour fastness to washing is noticeable which implies that the fabric better needs dry cleaning. Colour fastness to drycleaning and perspiration both for the colour change and for the staining are satisfactory.

3.2 Colour Measurements

The influence of five types of soils and soil removal is observed. The ΔE value is analysed between the stained fabric sample and the stain removed fabric sample. The ΔE value is the colour difference between the unstained fabric sample and the stained or stain removed fabric sample. The average ΔE value is calculated for the comparison between stained and stain removed fabric sample.

Table 3.2 shows that the ΔE values of the stain removed fabric samples are lesser than the ?E values of the stain applied fabric samples which incurs that the stain has been removed after the application of liquid CO_2 on to the fabric. Liquid CO_2 shows more difference in most of the stains when compared to perchloroethylene.

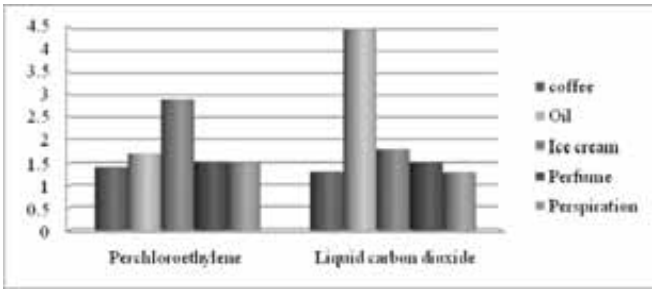

Figure 3.1: Comparison of K/S value of in stain removed fabrics

Figure 3.1 shows the difference in the K/S values of stain removed fabrics using liquid CO2 in comparison with the perchloroethylene. The graph clearly shows that liquid CO2 shows equal performance to perchloroethylene. The K/S values of the liquid CO2 are lower than the values of perchloroethylene which implies an excellent stain removal has been achieved. It can be used as a best alternative to the hazardous chemicals in dry cleaning in removing most of the stains used in this research.

Table 3.2: ΔE value of stained and stain removed fabric sample

Samples	Coffee		Oil		Ice cream		Perfume		Perspiration	
	S.A*	S.R*	S.A*	S.R*	S.A*	S.R*	S.A*	S.R*	S.A*	S.R*
Perchloro-ethylene	6.2	5.4	14.3	1.9	9.0	6.1	2.3	0.7	3.0	2.2
Liquid Carbon dioxide		2.1		11.1		2.9		1.3		0.9

S.A* = ΔE values of stain applied fabric sample S.R*=ΔE values of stain removed fabric sample

Most of the stains are very well removed by the Liquid Carbon dioxide as equal as Perchloro ethylene. As a whole, the Liquid Carbon dioxide used shows effective results.

Table 3.3: K/S value of the stain removed fabric sample

Chemicals	Coffee	Oil	Ice cream	Perf-ume	Persp-iration
Perchloroethylene	1.41	1.71	2.89	1.53	1.51
Liquid carbon dioxide	1.30	4.44	1.78	1.51	1.29

The strength of the stain is evaluated by measuring the K/S value of the stained area and the stain removed area of the fabric at three random positions and the average value is listed in the Table 3.3. Decrease in K/S value in stain removed fabrics using two different chemicals shows a positive result.

3.3. Detergency Performance Percentage

Table 3.4: Detergency % of the stain removed fabric sample

Chemicals	Coffee	Oil	Ice cream	Perf-ume	Persp-iration
Perchloroethylene	64.64	77.27	29.36	54.75	26.36
Liquid carbon dioxide	94.45	18.89	68.48	53.09	96.46

Table 3.4 shows the effect of detergency performance percentage between the eco-friendly chemicals and currently available dry-cleaning chemical (Perchloroethylene). Detergency performance is calculated using a percentage formula using the reflectance measurements in 520 nm wavelength.

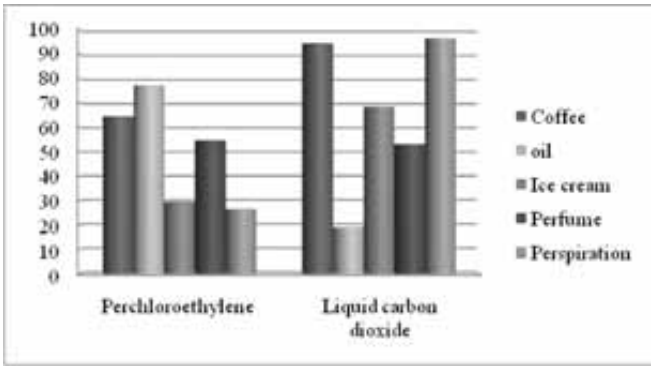

Figure 3.2: Comparison of Detergency Performance percentage of Stain removed

Figure 3.2 shows the detergency performance percentage of Stain removed fabrics using Perchloroethylene & Liquid Carbon dioxide. The eco-friendly chemicals, i.e, Liquid carbon dioxide is used in evaluating the detergency performance in removing the coffee, oil, ice cream, perfume and perspiration stain which shows tremendous results than Perchloroethylene. Liquid Carbon dioxide shows remarkable results when compared to perchloroethylene in removing the coffee, Ice cream, perfume and perspiration stains without any colour loss.

3.4. Surface Morphology Of Stained And Stain Removed Samples

It is interesting to investigate the surface morphology of stained and stain removed silk fabrics using liquid carbon dioxide by SEM. The SEM micrographs are illustrated in Figures 3.3 & 3.4. In the silk fabric micrographs, stained area appears as a non-uniform coating on the surface of the yarn and various stain deposits are visible in the interstices between yarns.

Figure 3.3: SEM image of stained fabric samples

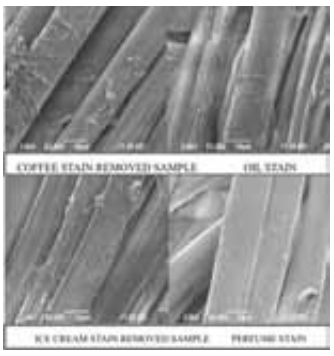

Figure3.4: SEM image of stain removed fabric

In SEM Micrographs (Figure: 3.3), the surface area of stains (coffee, oil, ice cream) shows a change or filthy surface is clearly visible whereas the perfume stain has only colour change and not any surface modification is analysed. In the stain removed samples, it can be seen that the stain was partially or completely removed (Figure: 3.4).

Fabric surface of stain removed sample is clear than the stained sample (Figure: 3.3). In some parts of the yarn, stains are likely to appear to a small extent. However, the micrographs of samples stain removed shows stain removal and no sign of destruction and damage to the surface of the silk yarns (Figure: 3.4).

5. Conclusion

This study clinches that the eco-friendly chemical liquid carbon dioxide can be a better replacement to the stain removing chemicals used by the dry cleaners commercially. From the data obtained in the study, liquid carbon dioxide shows a wide range of performance which is equivalent to perchloroethylene in most of the stains used in this study. The oil stain alone needs an additional surfactant to be removed completely.

6. Acknowledgement

The authors would like to thank for Sri Venkateswara Carbonic Gases (P)Ltd, Coimbatore and M.G. Ishwarya, M.Tech Scholar for their contribution related to this work.

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Texttreasure

"Do not go where the path may lead, go instead where there is no path and leave a trail."

- Ralph Waldo Emerson

Dimensional Stability of Woven Fabrics due to Soaking and Washing in Relation to Yarn Characteristic

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Abstract
Dimensional stability of fabric is an important property for apparel and home textile. On merely soaking in water fabrics undergo changes in dimensions due to relaxation of the strain. Besides, successive washes results in progressive shrinkage, which are of obvious interest to the consumer. Dimensional changes depend upon material, weave, yarn characteristics and finish. Thus the present study was undertaken to determine the dimensional changes of woven fabrics by soaking and washing the fabrics as per standard method and to study the relation between dimensional changes with the yarn characteristics. Twenty four fabric samples ranging from light weight to heavy weight were selected.. All physical testing was done on controlled, soaked and washed samples under standard testing conditions. Findings include the various factors which affects fabric shrinkage and correlation between fabric shrinkage and various yarn characteristics.

Keywords
Fabric dimension, Shrinkage, Soaking, Washing, Yarn characteristics

1. Introduction

Dimensional stability of fabric is an important property for apparel use. On merely soaking in water, woven fabrics undergo changes in dimensions due to relaxation of the strain, which are introduced during manufacturing and processing operations. The dimensional changes thus introduced are of obvious interest to the consumer. Most fabrics are produced under tensions which leave strains in the fabric. Unless these strains are fully released by the manufacturer before the fabric is made into a garment, relaxations shrinkage will ultimately occur. Relaxations shrinkage is the tendency of the yarns to revert to their normal, un stretched\ dimensions. If a fabric has not been fully relaxed by the manufacturer, dry cleaning or laundering will cause the fabric to continue its relaxations and shrinkage. Usually several cleanings will be required to relax it completely [1].

Shrinkage does not occur unless water gains access into the material by one or the another means. It can then be ascribed to two causes, swelling and releasing of strains. Cotton, linen and high-wet modulus rayon exhibit relaxation shrinkage. Regular rayon exhibits high relaxations shrinkage. Wool exhibits moderate relaxations shrinkage. Since new synthetic hydrophobic fibers have substantially zero-moisture regain, they are not going to shrink when laundered. Other manmade fibers show relaxation shrinkage. The largest amount of shrinkage is by increase of crimp, yarn shrinkage takes a second place, being generally much less than the increase of crimp, whilst fiber shrinkage is usually negligible [2].

Shrinkage is used as an advantage in manufacturing of some fabrics, for example fulling of wool closes up to the weave and makes a firmer fabric and shrinkage of the high twist yarn in crepes creates the surface crinkle. Shrinkage is a disadvantage to the consumer when it changes the length or size of a garment [3]. The use of higher twist yarns in a given fabric structure will restrict the fiber movement within yarns, and thus reduce the felting tendency during washing of the fabric. Nesting restricts yarn movement and hence reduces shrinkage [4].

The spun rayon fabrics when roughened up due to the friction by vigorous washing, the fibers can mat to-

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gether to give rise to a phenomenon similar to the felting of wool. A similar effect has been observed with certain cotton fabrics [5]. Compactness of woven fabric is affected by the relative direction of its warp and weft yarn twists. Compactness in turn affects the appearance and physical properties of the fabric. More compact is the fabric structure, less will be the freedom of movement of its fibers and yarns and consequently the less will be the tendency towards felting. It has been further shown that the relationship between twist and will direction plays an important role in the contraction of many fabrics [6]. In a study on dimensional changes in a canvas fabric after a standard washing treatment, shrinkages were observed [7].

Fabrics composed of hydrophilic fibers other than wool also shrink when laundered; there the mechanism is relaxation. The important features of the yarn structure are, the twist factor, the compactness and the degree of flattening [8].

The shrinkage of textile fabrics is dependent on fiber, yarn and fabric structures and on the tensions to which the yarns have been subjected in preparatory and weaving processes and outlines methods by which the tendency to shrink may be reduced [9]. When the yarns are wet, they swell, and consequently a warp thread has a longer bending path to take around a swollen weft thread. The warp length must either increase in length or alternatively, the weft threads must move closer together [10].

It has not been possible to predict shrinkage in warp and weft direction to any extent which are taking place during wet processing. However, it has been shown that fabric geometry especially crimp in warp and weft yarns, effect to a considerable extent, translation of both swelling effect and relaxation shrinkage of yarns into fabric shrinkage [11]. If the warp and weft settings, warp and weft yarn count and warp tension are known; the degree of warp and weft shrinkage can be calculated [12]. Fabrics treated with special finishes shrink in the first two washings and then their structure remains stable [13]. There is a shrinkage of 10-12% or more due to the effects of fiber shrinkage, yarn shrinkage and cloth structural changes involving an increased bending of the threads [14].

AATCC carried out tentative test methods using different washing, drying and restoration procedures. This test is intended for determining the dimensional changes of woven or knitted fabrics made of fibers other than wool, to be expected when the cloth is subjected to laundering procedures commonly used in the commercial laundry and the home. Four washing test procedures are established [15].

These fabrics would have great technical merit if its dimensions remain constant. Ability to shrink in washing is a feature of textile materials to which a great deal of attention has been given in past years. This is because merchants of fabrics and garments have the idea that they can serve the public better by ensuring that the sold materials keep their shape and size throughout their useful life. The result is that today it is possible to purchase a wide variety of goods carrying a guarantee that they will not shrink. Thus the present study was undertaken with the following objectives,

- To study the effect of soaking and washing on fabric dimensions.
- To study the dimensional changes of fabrics in relation to yarn characteristics.
- To study the changes in physical properties of the fabrics due to fabric shrinkage.

2. Materials and methods

2.1 Materials

Twenty four fabric samples from light weight to heavy weight were taken; lawn, voile, poplin, cambric, mull, grey sheeting, grey bed sheet cloth, coating and canvas fabric with plain and twill weaves were chosen.

2.2 Methods

The fabrics were tested for physical properties like yarn count, yarn twist, twist direction, thread density, cloth cover, crimp of yarn in fabric, fabric weight, fabric thickness etc. To determine Dimensional change of cloth by soaking in water, a specimen measuring 65cm x 65 cm was marked and cut from each of the twenty four test samples and treated according to the specified method. Another specimen measuring 30 cm x 30 cm was taken out from the treated (soaked) sample and given 25 washes. Thus all the physical testing was done on controlled soaked and washed samples under standard atmosphere i.e. relative humidity of 65 + 2 % and a temperature of 27 + 2^0C. The results were then evaluated by calculating separately the percentage of dimensional change (Shrinkage) in the warp and weft way direction. After the above tests, the final distance was measured and resultant shrinkage was expressed in percentage. All the tests of physical prop-

erties of soaked and washed samples were carried out and compared with the original samples, and the relationship between the physical properties and the fabric shrinkage was studied [16-24].

3. Results and discussion

3.1 Shrinkage of fabric after soaking

The warp way shrinkage was more when compared to weft direction. Percentage shrinkage was more significant in grey sheeting, grey bed sheet cloth and grey coating. Minimum shrinkage percentage was found in poplin and cambric. Total cloth shrinkage values are plotted in Figure 3.1

3.2 Shrinkage of fabric on washing

Shrinkage was more significant in sheeting and coating material. Maximum shrinkage was shown by coating fabric. Poplin and coating got extended in length in weft direction. Grey coating also showed significant shrinkage. It can be seen from the results that fabric shrinks after soaking and percentage shrinkage significantly increased after repeated washing.

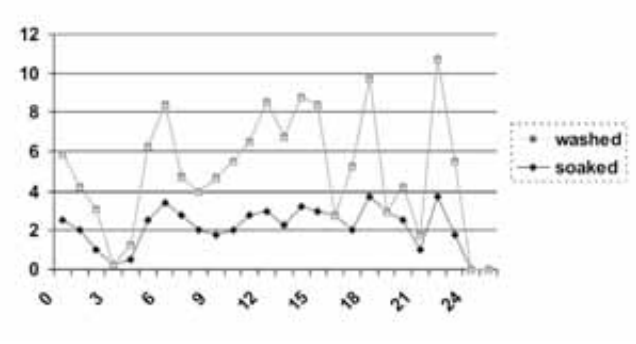

Figure 3.1: Total shrinkage of fabric on soaking and washing

X =sample number Y=percentage shrinkage

Table 3.1: Ends and Picks Per Inch

Sr.No.	Samples	Before Treatment		After Treatment		After 25 washes	
		Ends	Picks	Ends	Picks	Ends	Picks
1	Lawn (Plain)	95.8	76.0	99.5	76.6	99.6	76.7
2	Rubia Voile (Plain)	91.4	76.4	92.8	77.0	93.5	78.2
3	Poplin (Plain)	94.3	76.5	97.9	77.9	98.0	78.0
4	Poplin (Plain)	143.1	65.0	143.4	66.0	143.9	66.5
5	Cambric(Plain)	137.5	65.6	139.3	66.6	135.5	66.7
6	Mull (Plain)	62.0	44.0	63.5	44.6	63.0	45.7
7	Grey Sheeting(Plain)	85.7	73.6	85.8	77.4	86.1	78.3
8	Sheeting(Plain)	78.2	44.0	78.7	44.5	78.8	45.4
9	Sheeting (Plain)	59.0	48.9	59.2	49.8	59.3	49.0
10	Grey Sheeting - (Plain)	50.1	37.2	50.3	39.0	50.7	38.9
11	Grey Sheeting (Plain)	70.1	62.4	70.9	64.0	71.1	67.1
12	Grey Sheeting (Plain)	69.7	68.6	70.2	69.1	72.1	70.6
13	Grey Sheeting (Plain)	64.6	63.6	66.0	65.6	66.4	66.3
14	Grey Sheeting (Plain)	61.0	61.0	62.8	62.0	65.2	63.4
15	Grey Sheeting (plain)	60.3	50.0	60.6	52.6	62.0	52.9
16	Grey Sheeting (Plain)	60.1	58.4	61.3	60.2	62.1	60.6
17	Lining Cloth (Plain)	41.9	32.3	42.6	32.4	43.9	33.8
18	Lining Cloth (Plain)	42.7	30.1	43.7	31.1	44.0	31.5
19	Grey Bed sheeet Cloth (Plain)	52.5	45.8	53.1	49.3	53.7	50.1
20	Coating (2/1 Twill)	59.7	37.8	62.7	39.2	62.9	38.7
21	Coating (3/1 Twill)	104.5	46.6	106.1	48.6	106.3	50.0
22	Coating (3/1 Twill)	114.0	49.5	114.5	50.3	116.2	50.5
23	Grey Coating (3/1 Twill)	79.5	48.2	80.8	51.0	81.2	53.3
24	Canvas(Plain)	53.7	43.0	54.7	44.3	55.0	45.0

3.3 Effect of Soaking and Washing On Threads per Inch

From Table 3.1, it can be seen that ends per inch and picks per inch increased after soaking and further increased after washing.

3.3.1 Relation between Ends per Inch and Shrinkage on Soaking

The ends per inch and shrinkage are inversely related. Broadly, one can say that as the number of ends increases, shrinkage percentage decreases. Poplin, cambric and coating have more number of ends per inch and less shrinkage.

3.3.2 Relation between Picks per Inch and Shrinkage on Soaking

It can be seen from Figure 3.1 that poplin, cambric have given minimum shrinkage and low picks per inch, whereas grey bed sheet cloth and coating have shown maximum shrinkage. These samples have low number of picks per inch. There is no clear trend between shrinkage and picks per inch.

3.3.3 Relation between End/Inch and Cloth Shrinkage on Washing

Cambric, coating, grey coating have more number of ends per inch and low shrinkage. Grey sheeting and grey bed sheet cloth have less number of ends per inch and high shrinkage. In general one can say, as the number of ends per inch increases, shrinkage percentage decreases.

3.3.4 Relation between Picks per Inch and Shrinkage on Washing

Sheeting, coating have low picks per inch as well as low shrinkage. Lawn, rubia voils and poplin have higher picks per inch and low shrinkage. It was observed that there is no association between picks per inch and shrinkage.

3.3.5 Relation between Sett Ratio and Shrinkage on Soaking and washing

Shrinkage property is found to be inversely related with sett ratio. Higher the number of ends per inch then picks per inch, shrinkage values are reduced. In other words such fabrics are more stable to dimensional stability.

3.4 Relation between cloth cover and shrinkage

3.4.1 Relation between cloth cover and warp way shrinkage on soaking and washing

The values of cloth cover are given in Table 3.2. The relation between cloth cover and warp way shrinkage on soaking was found to be slightly significant. A negative relation between cloth cover and warp way shrinkage is seen for the majority of the samples. The correlation coefficient between cloth cover and warp way shrinkage after washing was found to be non-significant.

3.4.2 Relation between cloth cover and weft way shrinkage on soaking and washing

The relationship between cloth cover and weft way shrinkage was found to be inversely related. It was seen that the fabrics with low cloth cover gave higher shrinkage. The relation between cloth cover and weft way shrinkage after washing was not significant.

3.5 Effect of Yarn Count on Shrinkage

Warp yarn count and weft yarn count were inversely correlated with shrinkage after soaking and washing. The fabrics with coarse yarn count had more shrinkage and fabrics with medium yarn count had moderate shrinkage. Fabrics with finer yarn count had low shrinkage i.e. with the increase in yarn count there is decrease in percentage shrinkage. The fabrics with finer yarns are more dimensionally stable.

Table 3.2: Cloth Cover

Sr. No.	Samples	A-Before Treatment			B-After Soaking			C-After Washing		
		Warp Cover factor (K1)	Weft Cover Factor (K2)	Cloth Cover mean	Warp Cover factor (K1)	Weft Cover Factor (K2)	Cloth Cover mean	Warp Cover factor (K1)	Weft Cover Factor (K2)	Cloth Cover Mean
1	Lawn (Plain)	12.413	9.843	17.890	12.643	9.801	18.019	12.528	9.769	17.297
2	Rubia Voile (Plain)	13.349	11.149	19.183	12.807	11.238	18.905	13.142	11.132	19.049
3	Poplin (Plain)	12.756	11.517	19.026	12.843	11.473	19.057	12.830	11.281	18.941
4	Poplin (Plain)	22.222	10.344	24.357	22.077	10.241	24.243	21.523	10.235	23.891
5	Cambric (Plain)	21.368	10.289	23.781	20.692	9.795	23.249	20.162	9.771	22.897
6	Mull (Plain)	11.757	6.772	15.686	11.008	6.742	15.100	11.061	6.739	15.137
7	Grey Sheeting (Plain)	15.474	13.583	21.551	15.263	13.803	21.542	15.262	13.866	21.570
8	Sheeting(Plain)	14.904	7.140	18.249	14.121	7.205	17.693	14.066	7.396	17.746
9	Sheeting (Plain)	14.107	11.492	19.809	13.574	10.578	19.024	13.122	10.316	18.603
10	Grey Sheeting (Plain)	10.740	7.289	15.233	10.719	7.553	15.381	10.040	7.391	14.780
11	Grey Sheeting (Plain)	12.932	10.369	18.512	13.055	11.120	18.991	12.718	11.527	19.009
12	Grey Sheeting (Plain)	12.185	12.337	19.153	11.930	12.087	18.868	12.089	12.176	19.008
13	Grey Sheeting (Plain)	15.124	12.659	20.945	14.854	12.279	20.619	14.478	12.277	20.558
14	Grey Sheeting (Plain)	14.098	13.576	20.838	13.704	13.614	20.655	13.432	13.798	20.610
15	Grey Sheeting (plain)	13.988	10.947	23.283	13.377	11.513	16.390	13.475	11.574	19.479
16	Grey Sheeting (Plain)	14.110	12.371	20.247	13.758	12.796	20.267	13.851	12.815	20.327
17	Lining Cloth (Plain)	8.227	6.502	12.814	8.213	6.559	12.849	8.414	6.821	13.185
18	Lining Cloth (Plain)	8.929	5.950	12.982	8.611	5.995	12.763	8.589	6.062	12.791
19	Grey Bed sheeet Cloth (Plain)	15.554	13.933	21.668	15.583	14.932	22.205	15.317	15.160	22.183
20	Coating (2/1 Twill)	15.118	8.701	19.122	15.274	8.485	19.445	14.942	8.312	18.818
21	Coating (3/1 Twill)	24.491	13.293	26.157	24.734	13.381	26.295	24.548	13.684	26.235
22	Coating (3/1 Twill)	26.271	13.756	27.12	26.261	73.808	27.119	26.438	13.453	27.188
23	Grey Coating (3/1 Twill)	24.354	14.142	26.196	24.384	14.974	26.318	23.598	15.582	26.042
24	Canvas(Plain)	20.924	16.649	25.132	21.187	15.751	25.02	19.95	15.959	24.538

Table 3.3: Yarn Count (Ne) In Fabrics

Sr. No.	Samples	A. Before Treatment		B. After Treatment		C. After Soaking		D. After Washing	
		Warp	Weft	Warp	Weft	Warp	Weft	Warp	Weft
1	Lawn (Plain)	59.81	59.62	75.00	69.95	61.93	60.92	63.20	61.64
2	Rubia Voile (Plain)	2/92.54	2/92.94	54.00	50.26	2/105	2/93.88	2/101.22	2/98.68
3	Poplin (Plain)	54.30	44.70	62.21	44.58	58.06	46.10	58.34	47.80
4	Poplin (Plain)	41.41	39.48	45.30	49.98	42.19	41.53	40.70	42.21
5	Cambric(Plain)	41.71	41.96	43.27	49.20	45.32	46.23	47.87	46.59
6	Mull (Plain)	27.81	42.21	36.58	42.68	33.27	43.75	34.53	45.98
7	Grey Sheeting (Plain)	2/61.78	2/59.36	33.33	30.72	2/63.2	2/62.88	2/63.64	2/63.76
8	Sheeting(Plain)	27.39	37.92	34.76	37.39	31.06	38.146	31.38	37.677
9	Sheeting (Plain)	17.49	18.18	23.21	18.07	19.02	22.16	20.42	22.56
10	Grey Sheeting - (Plain)	21.67	25.77	24.35	24.55	22.02	26.66	25.60	27.70
11	Grey Sheeting (Plain)	29.30	35.75	29.89	33.60	29.488	33.12	31.25	33.885
12	Grey Sheeting (Plain)	33.00	31.28	29.76	33.70	34.62	32.68	35.57	33.62
13	Grey Sheeting (Plain)	18.47	25.56	21.02	24.44	19.74	28.54	20.27	28.90
14	Grey Sheeting (Plain)	18.72	20.19	21.52	20.86	21.00	20.74	23.56	21.11
15	Grey Sheeting (plain)	18.40	20.86	19.50	22.79	20.52	20.87	21.17	20.89
16	Grey Sheeting (Plain)	18.08	21.98	19.89	22.77	19.85	22.13	20.10	22.36
17	Lining Cloth (Plain)	26.06	24.22	25.24	23.72	26.90	24.40	27.2	24.55
18	Lining Cloth (Plain)	23.19	25.42	23.42	23.67	25.75	26.91	26.24	27.00
19	Grey Bed sheeet Cloth (Plain)	11.61	10.90	13.01	10.79	11.61	10.90	12.29	10.92
20	Coating (2/1 Twill)	15.75	19.07	17.93	19.46	15.90	21.34	17.72	21.676
21	Coating (3/1 Twill)	18.38	12.50	15.48	12.26	18.40	13.19	18,75	13.35
22	Coating (3/1 Twill)	18.83	13.21	17.73	13.29	19.01	13.27	19.25	14.09
23	Grey Coating (3/1 Twill)	10.79	11.52	11.36	11.07	10.98	11.60	11.84	11.70
24	Canvas(Plain)	2/13.32	2/13.34	7.45	8.14	2/13.33	2/15.82	2/15.20	2/15.90

3.6 Relation between Twist Multiplier and Shrinkage

3.6.1 Relation between Twist Multiplier and Shrinkage on Soaking

It was found that there is no association between twist multiplier (TM) and warp way shrinkage on soaking. Lawn, poplin, cambric, coating have very low shrinkage, whereas rubia voile which has highest TM has shown low shrinkage. Grey sheeting, bed sheet cloth and coating have relatively low TM, but resulted in higher shrinkage. No clear trend is observed for TM and warp way shrinkage on soaking. With the increase in twist multiplier, shrinkage also increases.

Table 3.4: Twist Multiplier (TM) and percentage shrinkage

Sr. No	Samples	TM of warp	TM of weft	% Shrinkage on soaking (warp)	% Shrinkage on soaking (Weft)	% Shrinkage on washing (warp)	% Shrinkage on washing (weft)
1	Lawn (Plain)	3.943	2.93	0.76	4.48	1.72	5.04
2	Rubia Voile (Plain)	3.060	Single-3.05 Double -5.29	1.76	2.40	2.96	1.48
3	Poplin (Plain)	3.446	3.54	1.36	1.84	2.68	0.64
4	Poplin (Plain)	3.764	2.84	0.64	0.16	0.92	-1.32
5	Cambric(Plain)	3.657	3.47	0.60	0.80	1.32	0.28
6	Mull (Plain)	4.475	3.15	1.64	3.62	2.96	4.42
7	Grey Sheeting (Plain)	4.138	Single-2.14 Double -4.05	5.44	1.92	7.04	3.00
8	Sheeting(Plain)	4.559	3.76	2.12	1.80	3.84	-0.08
9	Sheeting (Plain)	4.754	4.47	2.52	2.00	4.68	0.12
10	Grey Sheeting - (Plain)	4.043	3.34	2.72	0.80	5.64	0
11	Grey Sheeting (Plain)	3.706	3.46	3.20	1.20	5.20	1.48
12	Grey Sheeting (Plain)	3.871	3.76	2.40	1.08	3.68	3.47
13	Grey Sheeting (Plain)	4.132	3.32	2.32	4.12	4.88	6
14	Grey Sheeting (Plain)	4.299	3.50	3.80	0.92	5.96	2.64
15	Grey Sheeting (plain)	4.042	3.87	5.32	1.68	7.60	3.56
16	Grey Sheeting (Plain)	4.388	3.89	4.20	2.04	6.80	4.16
17	Lining Cloth (Plain)	3.996	3.88	2.56	3.24	4.28	4.04
18	Lining Cloth (Plain)	4.664	3.94	2.24	2.32	4.16	2.44
19	Grey Bed sheeet Cloth (Plain)	3.9150	3.80	6.04	1.68	8.04	3.68
20	Coating (2/1 Twill)	3.684	3.45	1.04	5.36	2.12	5.64
21	Coating (3/1 Twill)	3.885	4.02	1.60	2.04	2.16	1.40
22	Coating (3/1 Twill)	3.922	3.77	2.52	-0.16	2.80	-1.20
23	Grey Coating (3/1 Twill)	3.285	3.41	5.68	1.96	10.24	3.32
24	Canvas(Plain)	4.937	Single-1.58 Double -3.96	2.48	0.96	2.48	2.44

3.6.2 Relation between Twist Multiplier and Shrinkage on Washing

It was observed that majority of the samples showed increase in twist multiplier after washing. The fabrics with high twist multiplier resulted in low shrinkage on washing. It was also observed that majority of the samples showed decreases in twist multiplier after washing. The relation between twist multiplier and cloth shrinkage on washing was found to be directly related. More the twist multiplier higher is the shrinkage.

3.7 Relation between Crimp and Shrinkage

3.7.1 Relation between Crimp and Shrinkage on soaking

These properties were found to have direct relation. Fabrics with more crimp resulted in higher shrinkage.

The relationship between total crimp and weft way shrinkage was found to be significant and it was a negative relation. It indicated that as the total crimp increased, shrinkage decreased.

Table 3.5: Yarn Crimp (Percentage)

Sr. No.	Samples	A-Before Treatment			B-After Soaking			C-After Washing		
		Warp (%)	Weft (%)	Total (%)	Warp (%)	Weft (%)	Total (%)	Warp (%)	Weft (%)	Total (%)
1	Lawn (Plain)	1.95	14.05	5.15	2.60	15.25	5.50	3.40	16.8	5.94
2	RubiaVoile(plain)	9.95	22.45	7.89	8.80	20.05	7.45	16.05	22.25	8.72
3	Poplin(Plain)	4.15	11.10	5.37	6.05	11.10	5.79	6.40	12.10	6.00
4	Poplin (Plain)	2.92	3.19	6.11	9.15	3.47	4.88	8.85	10.40	6.95
5	Cambric(Plain)	6.80	9.00	5.61	7.80	6.65	5.37	7.435	8.10	5.58
6	Mull (Plain)	2.55	6.65	4.18	3.95	11.10	5.32	4.30	9.30	5.12
7	GreySheeting (Plain)	11.3	6.20	5.85	14.55	7.55	6.56	15.15	6.65	6.47
8	Sheeting (Plain)	7.25	11.60	6.06	2.90	14.05	5.45	4.50	11.45	5.505.50
9	Sheeting (Plain)	5.35	12.15	5.81	8.80	13.30	6.62	7.55	10.95	6.05
10	GreySheeting (Plain)	1.70	11.00	4.62	4.50	11.70	5.54	9.35	7.60	5.07
11	GreySheeting (Plain)	3.65	11.70	5.33	8.35	11.95	6.35	7.85	10.35	6.02
12	GreySheeting (plain)	8.40	7.20	5.58	14.40	12.35	7.30	11.65	10.25	6.61
13	GreySheeting (Plain)	9.80	7.15	5.80	16.45	10.60	7.31	15.75	10.60	7.22
14	Grey Sheeting (Plain)	11.15	7.60	6.15	16.65	15.15	7.97	12.60	16.75	7.64
15	GreySheeting(plain)	9.45	8.55	5.99	15.50	9.10	6.95	13.70	10.25	6.90
16	GreySheeting (Plain)	13.50	7.05	6.33	16.25	8.60	6.96	11.54	8.50	6.30
17	Lining Cloth - (Plain)	2.90	7.35	4.41	5.55	8.70	5.31	8.00	7.45	5.56
18	Lining Cloth - (Plain)	5.05	5.15	4.52	5.85	9.15	5.44	6.7	5.06	4.840
19	GreyBedsheeet Cloth (Plain)	12.35	5.80	5.92	21.60	7.53	8.30	15.0	10.20	7.065
20	Coating (2/1 Twill)	2.20	5.10	3.74	3.35	14.40	5.62	3.75	10.70	5.206
21	Coating (3/1 Twill)	5.40	12.00	5.78	8.30	8.20	5.74	8.15	9.80	5.984
22	Coating (3/1 Twill)	7.20	10.85	5.97	9.45	12.25	6.57	9.45	9.55	6.164
23	Grey Coating (3/1 Twill)	12.15	5.60	5.86	16.60	7.55	6.82	20.50	7.80	7.320
24	Canvas (Plain)	21.10	5.10	6.85	20.75	6.65	7.14	24.90	8.20	7.852

3.7.2 Relation between Crimp and Shrinkage on Washing

No clear trend was observed between total crimp and warp way and weft way shrinkage on washing. The experimental results of cloth crimp are given in Table 3.5.

3.8 Relation between Cloth Weight and Shrinkage

3.8.1 Relation between Cloth Weight and Shrinkage on Soaking

It is observed that after soaking, the weight per square meter of the fabric increased which is due to increase in threads per inch on soaking. The relation between cloth weight and shrinkage was found to be insignificant.

3.8.2 Relation between Cloth Weight and Shrinkage on Washing

After soaking, there was a significant increase in weight per square meter and after washing, it increased further. This increase in weight per square meter is due to increase in threads per inch. There is no relation between cloth weight and shrinkage after washing.

3.9 Relation between Cloth Thickness and Shrinkage

3.9.1 Relation between Cloth Thickness and Cloth Shrinkage on Soaking

The thickness of the cloth samples significantly increases after soaking. Thickness increases due to the close structure of the fabric due to fabric shrinkage. There is no relation between cloth thickness and shrink-

age on soaking. Considering all the fabric samples, relation between cloth shrinkage and cloth thickness was found to be insignificant.

3.9.2 Relation between Cloth Thickness and Cloth Shrinkage on Washing

The thickness of the fabric increases on soaking and further on washing too. As indicated earlier, thickness increases due to close structure of the fabric on soaking. Again it is seen that thickness increased more significantly in washed samples. There is no relation between fabric thickness and shrinkage on washing. The relation between cloth thickness and cloth shrinkage was found to be insignificant.

4. Conclusion

From the study it can be concluded that the thread density, cloth cover, turns per inch, cloth crimp, cloth weight, cloth thickness were found to be increased on soaking and washing. But no correlation was observed between shrinkage and physical properties like picks per inch, cloth weight and cloth thickness. Shrinkage is observed to be independent from cloth weight. Yarn count is also affected by soaking and washing. As observed by the other workers, the yarn became coarse. But in the present study, as seen from the results, yarn count increased due to sizing present in the selected sample.

5. Acknowledgement

The author is thankful to (Late) Professor K.T. Aswani, Textile Manufacture Department, V.J.T.I, Mumbai for his consistent guidance and support.

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Textsmile

Lawyer: 'Now that we have won, will you tell me confidentially if you stole the money?'
Client: 'Well, after hearing you talk in court yesterday, I am beginning to think I didn't.'

Wicking Behavior of Draw Textured Yarns and their Fabrics

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Abstract
In order to study the moisture management of polyester drawn textured yarns and their fabrics, false twist textured yarns with different bulkiness were produced using polyester yarns which are partially oriented on draw texturising machine. These textured yarns were converted into fabrics using sample weaving machine. The textured yarns and their fabrics were tested for wetting and wicking. The data of testing revealed that the wicking rate of polyester filament yarn increases after texturising and was found to be higher at maximum bulk value. In case of fabrics, the wicking rate was found to increase initially with crimp but at higher crimp levels it was found to cease. Also, the textured yarn and their fabrics were found to have good wetting as compared to flat yarn and their fabrics.

Keywords
Bulk, Crimp, Drop absorbency, Surface Energy, Texturising, Wicking.

1. Introduction

A human body is a complicated thermodynamic system in which energy is constantly produced by its metabolic activity and from which energy must be continuously dissipated into the surroundings by dry thermal transport or latent heat loss accompanying water evaporation. Clothing may modify this heat dissipation process. Four properties are suggested as critical for thermal comfort of clothed body :(a) effectiveness to stagnate air, (b) thermal resistance, (c) vapour transmission characteristics, and (d) liquid water transport characteristics. These transport characteristics are, however, the results of a complicated process of fabricating fibres into clothing fabric [1].

Human rely on the evaporation of sweat to remain comfortable and prevent overheating in hot environments and during exercise. In some situations the evaporation rate from wet skin is less than the rate of sweat secretion. Discomfort results from buildup of sweat on the skin and insufficient evaporative heat [2].The ability of clothing materials to transport moisture vapour is a critical determinant of wear comfort, especially in conditions that involve sweating. The build of humidity in clothing microclimate or the air space between a clothing layer and the sweat wetted skin is known to contribute to sensations of dampness and clamminess, especially during cooling period that follows intervals of sweat generating exercise. As sweating proceeds, the clothing microclimate humidity rises to a high value. The influence clothing materials have on such build up depends on their ability to transport vapour. A fabric that is perceived as comfortable should transmit water vapour during the period the body sweats actively and when the body stops sweating, the fabric should release the moisture vapour held in the space to the atmosphere to reduce the humidity at the skin. Thus, the wicking property of fabric is very important property from the comfort point of view [3].

A spontaneous transport of a liquid driven into a porous system by capillary forces is termed as wicking. These capillary forces are caused by wetting. Wicking is a result of spontaneous wetting in a capillary system. Wetting and wicking are not different processes. Wetting is prerequisite for wicking. A liquid that does not wet fibres cannot wick into a fabric [4]. When the fibres in assembly are wetted by a liquid, the resulting capillary forces drive liquid into the capillaries created by spaces between fibres in wicking process. In general, wicking takes place when a liquid travels along

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the surface of the fibre but is not absorbed into the fibre. This type of flow is governed by properties of liquid-solid surface interactions and geometric configuration of pore structure [5]. The capillary size between filaments in yarn is important to have good wicking in yarn. This capillary size between filaments could be varied by imparting different crimp levels in filament yarns by means of texturising. Therefore, this work is undertaken to study the wicking and wetting of textured yarns with various crimp levels.

2. Materials and Methods

2.1 Material

Polyester (POY) of 126/34 denier was used.

2.2 Methods

2.2.1 Yarn Production

Draw textured yarns with different bulk levels were manufactured by varying the D/Y parameter of the machine and a flat (untextured) yarn was also manufactured without using the false twister.The draw texturing machine parameters are shown in Table 2.1.

Table 2.1: Draw Texturising Machine Parameters

Parameters	Particulars
Delivery Speed	400 m/min
Primary Heater Temperature	180 °C
Secondary Heater Temperature	160 °C
Draw ratio	1.8
D/Y ratio	1.7, 1.8, 1.9, 2.0, 2.1, 2.2
Stabilising overfeed	4 %
Take-up overfeed	6 %

2.2.2 Fabric Production

These draw textured yarns were converted into fabrics using sample weaving machine. The warp and weft yarns were same. The fabric production parameters are shown in Table 2.2.

Table 2.2: Fabric Production Particulars

Parameters	Particulars
Fabric width	20 inches
Fabric length	2.5 metres
Air pressure	6 bar
Ends per Inch	80
Picks per Inch	80
Machine Speed	45 rpm
Weave	plain

2.3 Testing

The following tests were carried out for POY, Flat yarns, textured yarns and their Fabrics.

2.3.1 Feed yarn properties

Linear density

Linear density of POY, flat and textured yarns was tested by ASTM D1907-07.

2.3.2 Textured yarn properties

Crimp rigidity

The crimp rigidity is a measure of the ability of a textured yarn to recover from stretch and is related to the bulking potential of the yarn. The crimp rigidity tester developed by H.A.T.R.A. (Hosiery and Allied Trades Research Association) was used. In this test, a load equivalent to 0.1g/den was suspended from a skein of yarn that was immersed in water at room temperature. After 2 min, its length L1 was measured. The load was then reduced to 0.002 g/den and after another 2 min, the reduced length L2 was measured [6]. The crimp rigidity was calculated by the formula:

$$\text{Crimp rigidity} = \frac{(L1-L2)}{L1} \times 100$$

Physical bulk

The physical bulk of the textured yarns was calculated by using Du Pont's method [7]. A length of yarn weighing 85 gm was wound on the package before and after texturing at the same tension. The physical bulk was calculated.

$$\text{Physical bulk (\%)} = \frac{\text{(Package density of parent yarn (g/cc)}}{\text{(Package density of textured yarn (g/cc)}} \times 100$$

Wicking height

Wicking height of draw textured yarns was measured as per German standard DIN 53924. A yarn sample of 25 cm length was suspended vertically with its lower end immersed in a reservoir of 200 ml distilled water. To the vertically suspended sample 2 gm of load was attached at the lower end of the sample. Ink was added to the reservoir of distilled water for tracking the movement of water. The height reached by the water in the yarn above the water level in the reservoir was measured at different time intervals.

Drop absorbency

A weight was attached at one end on the sample to impart tensile force in the yarn equal to the weight. The custom made tiny pipette was used to measure

water to an accuracy of 0.5 mg. A water droplet was placed on the yarn and the time taken for the water droplet to wick into the yarn and disappear was measured as drop absorbency time.

2.3.3 Fabric properties

Wicking height

Wicking height of fabrics was measured as per German standard DIN 53924.

Drop absorbency

Drop absorbency was tested by AATCC/ASTM test method TS-018 in which drop absorbency of textiles was tested by measuring the time it takes for a drop of water placed on the fabric surface to be completely absorbed in the fabric. In this method sample was placed over the top of the beaker so that the centre is unsupported. A measured drop of water was placed on the fabric 1cm from the surface. Time for the water drop to be absorbed completely was noted.

Air permeability

Air permeability of the fabrics was tested by ASTM D737.

3 Results and Discussion

3.1 Wicking Behavior of Textured Yarns

The characteristics of draw textured yarns are as shown in Table 3.1.The wicking rate of flat yarn and draw textured yarns are shown in Table 3.2. Sample 1 is flat yarn and samples 2 to sample 7 are draw textured yarns.

Table 3.1: Characteristics of Draw Textured Yarns

Sample No.	Characteristics of draw textured yarns		
	Denier	Bulk (%)	Crimp rigidity (%)
Sample 1	77	-	-
Sample 2	77	189	6.8
Sample 3	78	192	7.2
Sample 4	78	192	8.1
Sample 5	79	194	8.5
Sample 6	79	195	9.6
Sample 7	80	195	9.8

Table 3.2: Wicking Rate of Textured Yarns

Sample No.	Wicking height (cm)			
	5 min	10 min	15 min	20 min
Sample 1	2.4	2.7	2.8	2.8
Sample 2	3.6	3.7	3.7	3.7
Sample 3	3.5	3.6	3.7	3.7
Sample 4	3.6	3.8	3.9	4
Sample 5	3.6	3.8	3.8	4
Sample 6	3.9	4	4	4
Sample 7	4	4	4	4

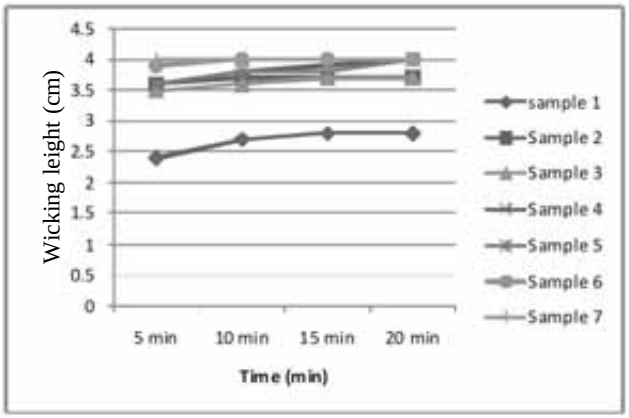

Figure 3.1: Effect of time on wicking height of draw textured yarns

As shown in Figure 3.1, there is significant difference in wicking rate of untextured (flat) and textured yarns and the wicking height of filament yarn is found to increase after draw texturing. The increase in wicking rate of filament yarns after draw texturising is due to the increase in bulkiness of yarn. Draw texturing process improves the bulkiness of filament yarns. This bulkiness of yarn is due to increase in inter-filament spaces created in textured yarns. Wicking performance is the result of capillary pressure and permeability. As a result of increase in bulk there is increase in permeability. Increase in bulk also increases capillary pressure. This increase in capillary pressure may be because of increase in surface energy of polyester yarn after texturising. The increase in surface energy lowers the contact angle and textured yarns are thus more easily wettable. As wetting is a pre-requisite for wicking, easy wettability leads to better wickability of textured yarns. Thus, better capillary penetration of the liquid occurs in the inter-filament spaces. Therefore, draw textured yarn showed more wicking rate than the cor-

responding untextured yarn. From Figure 3.1, it is clear that wicking rate is comparatively higher at the commencement of test but as time proceeds wicking lows down and finally it ceases. The moment wicking stops is the point at which force of gravity and capillary pressure balance each other.

3.1.1 Drop absorbency of textured yarns

Table 3.3 and Figure 3.2 show drop absorbency for different samples. It is clear from the table that drop absorbency time for fully drawn (untextured) yarn is considerably higher as compared to textured yarns. This may be because fully drawn yarn lacks bulk, crimp and so inter-filament distance is lower for drop to disappear in the yarn. While on the other hand, textured yarn because of higher bulk and crimp provides larger area for drop to be absorbed into the yarn. Drop absorbency tends to depend on surface energy or surface tension. Surface energy of flat polyester is between 41-47 dynes/cm. This lower surface energy can be one of the reasons for higher drop absorbency time of flat polyester. On the other hand, surface energy of distilled water is 72 dynes/cm. The water will tend to wet a material only when a substrate has higher surface tension than water itself. As surface tension of flat polyester is lower than water, it is not easily wettable. On the other hand textured yarns show considerably lower drop absorbency time (good wetting) which indicates that textured yarns may have higher surface energy/tension than water. Due to this high surface energy textured yarn and water droplet form lower angle of contact, resulting in easy wettability and lower drop absorbency time. Lower drop absorbency time for textured yarns indicates that these yarns are easily wettable. Therefore, textured yarns also show higher wicking heights as wetting is pre-requisite for wicking.

Table 3.3: Drop absorbency (time) of textured yarns

Sample no.	Time (sec)
Sample 1	217
Sample 2	20
Sample 3	22
Sample 4	20
Sample 5	22
Sample 6	18
Sample 7	18

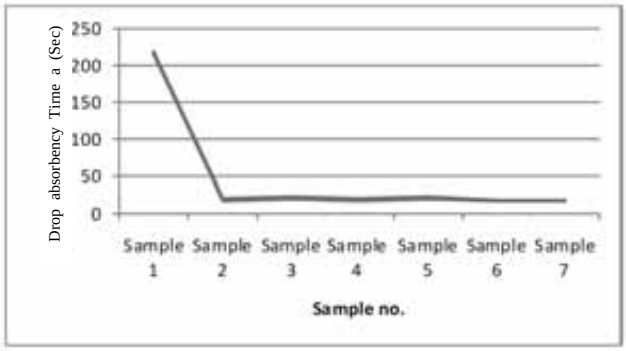

Figure 3.2: Drop absorbency for textured yarns

3.2 Wicking behavior of textured yarn-fabrics

3.2.1 Wicking behavior of textured yarn-fabrics

Tables 3.4 and 3.5 show the wicking heights of textured yarn fabrics tested warp-way and weft-way respectively at intervals of 5 min. The wicking height is found to be higher in case of textured yarn fabrics as compared to flat yarn fabrics and wicking increases with yarn bulk up to a certain extent and with further increase in bulk the wicking is found to cease, as shown in Figures 3.3 and 3.4. This behavior indicates that the fabrics wicking will be highest at certain physical bulk of textured yarn.

Table 3.4: Wicking rate of Textured yarn Fabrics-Warp Way

Sample No.	Wicking height (cm)			
	5 min	10 min	15 min	20 min
Sample 1	2.7	3.1	3.4	3.5
Sample 2	8.2	10	11	11.5
Sample 3	8.2	10	11	11.5
Sample 4	8.5	10.5	11.4	12
Sample 5	0	0	0	0
Sample 6	0	0	0	0
Sample 7	0	0	0	0

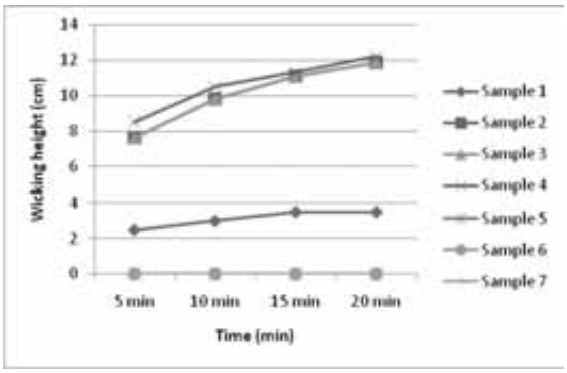

Figure 3.3: Effect of time on wicking height of fabrics warp-way

Table 3.5: Wicking rate of Textured yarn Fabrics- Weft Way

Sample No.	Wicking height (cm)			
	5 min	10 min	15 min	20 min
Sample 1	2.5	3	3.5	3.5
Sample 2	7.6	9.8	11.1	11.9
Sample 3	7.6	9.8	11.1	11.9
Sample 4	8.5	10.5	11.3	12.2
Sample 5	0	0	0	0
Sample 6	0	0	0	0
Sample 7	0	0	0	0

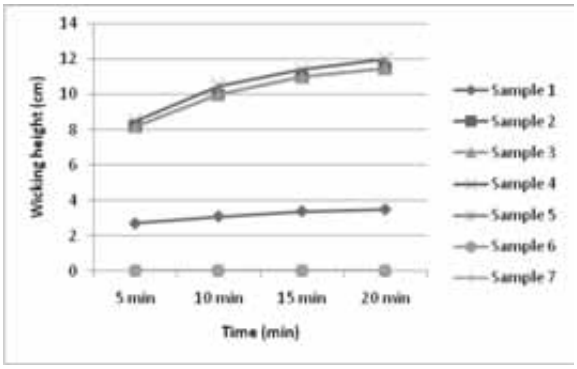

Figure 3.4: Effect of time on wicking height of fabrics weft-way

There is increase in wicking rate from flat yarn fabrics to textured yarn fabrics and this may be due to increase in bulkiness of textured yarns, providing fine capillary for the transport of water. With further increase in bulkiness, the yarns in the fabric may come closer than the minimum distance required for capillary action to take place and so wicking is found to cease. The weave used in manufacturing the fabric was plain weave. The point of intersection of yarns in the fabric acts as new reservoir for the transport of water [8]. As the textured yarns have higher bulkiness, this reservoirs may be larger and hold large amount of water. Thus, this larger reservoir may be leading to higher wicking heights because of larger water holding capacity. Also, higher air permeability of fabrics may be one of the reasons for higher wicking heights in textured yarn-fabrics.

From Figure 3.4, it is clear that the wicking rate is considerably higher for initial five minutes. At this point capillary force is considerably higher than gravitational force. But, later with time gravitational force dominates capillary force and rate tends to fall down. When the gravitational force and capillary force tend to be in equilibrium the wicking ceases and the resultant force acting is zero.

3.2.2 Wicking behavior of textured yarn-fabric (diagonal way)

The wicking trend obtained in diagonal direction is similar to trend in warp and weft direction but the wicking height is higher as compared to warp and weft direction which can be seen in Table 3.6.

Table 3.6: Wicking rate of Textured yarn Fabrics- Diagonal Way

Sample No.	Wicking height (cm)			
	5 min	10 min	15 min	20 min
Sample 1	3.8	4.3	4.6	4.7
Sample 2	8.9	11.4	12.8	13.8
Sample 3	8.2	10	11	11.5
Sample 4	9	11.6	13	13.8
Sample 5	0	0	0	0
Sample 6	0	0	0	0
Sample 7	0	0	0	0

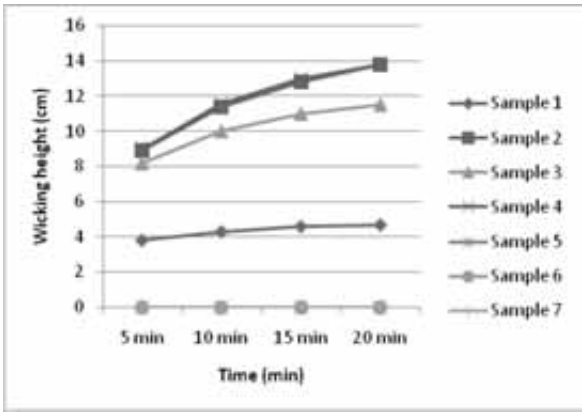

Figure 3.5: Effect of time on wicking height of fabrics diagonal-way

Figures 3.3, 3.4 and 3.5 show that there is higher wicking height in case of diagonal direction and this is because the weight applied during the wicking test resulted in higher stretch of fabric bringing capillaries i.e. yarns closer thereby increasing capillary pressure. The wicking height is inversely proportional to radius of capillary. Thus, capillary pressure will be more in smaller radius capillaries. This increase in capillary pressure causes the liquid to rise to higher height.

3.2.4 Drop Absorbency (wetting) of the Textured Yarn- Fabrics

Table 3.7: Characterization of Draw-Textured Yarn-Fabrics

Sample No.	Characteristics							
	EPI	PPI	GSM	Thickness (mm)	Warp Denier	Weft Denier Air	Cover Factor	Permeability ($cm^3/cm^2/sec$
Sample 1	86	98	69	0.13	103	89	19.2	7
Sample 2	100	96	72	0.2	107	98	20.6	32
Sample 3	91	94	80	0.22	103	98	19.6	32
Sample 4	100	80	72	0.24	103	98	19.4	35
Sample 5	100	100	73	0.24	98	98	20.6	30
Sample 6	92	96	72	0.24	98	98	19.4	32
Sample 7	100	94	71	0.24	89	85	19.3	31

From Table 3.7, it is clear that the untextured yarn-fabric has lower air permeability as compared to draw textured yarn-fabrics. Draw textured yarn-fabrics have higher air permeability because of higher crimp and bulk providing more inter filaments spaces for the passage of air. Higher bulk leads to more open structure and increased thickness, providing more opening for the passage of air. Higher air permeability may also be one of the reasons for higher wicking of Draw-textured Yarn-Fabrics as compared to flat-yarn Fabrics.

Table 3.8: Drop Absorbency of Textured Yarn-Fabrics

Fabrics	Absorbency time in seconds
Sample 1	53.03
Sample 2	1.856
Sample 3	3.18
Sample 4	3.638
Sample 5	937.8
Sample 6	Nil
Sample 7	Nil

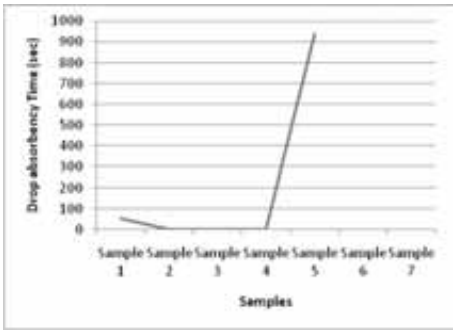

Figure 3.6: Drop absorbency time for different fabric samples

From Table 3.8 and Figure 3.6, it is clear that drop absorbency time for textured yarn -fabrics is lower than flat yarn fabrics. This indicates that textured yarn fabrics are more easily wettable than flat yarn fabrics. Also, wetting is pre-requisite for wicking. Because of easy wettability of textured yarn fabrics, they show higher wicking rate as compared to flat yarn fabrics. This is true up to a certain bulk level beyond which due to drastic reduction in capillary spaces the drop tends to be spherical on surface of fabric and it is not absorbed into the fabric. Therefore, there is an optimum level of bulk of textured yarns at which wetting and wicking will be maximum.

4. Conclusion

The wicking rate of filament yarn increases after draw-texturising. The increase in wicking rate of filament yarns after draw texturising is due to the higher bulkiness of textured yarns. The bulkiness of yarn is due to increase in inter-filament spaces created in textured yarns. The better capillary penetration of the liquid occurs in the inter-filament spaces. Therefore, draw textured yarns show more wicking rate than the corresponding untextured yarn.

The wicking height is found to be higher in case of textured yarn-fabrics as compared to flat yarn fabrics up to a certain extent and with further increase in crimp, the wicking is found to cease. Higher wicking height was observed in case of diagonal direction. Wetting of textured yarn fabrics was also higher than untextured yarn fabrics. Higher wicking of draw-textured yarn fabrics as compared to untextured yarn-fabrics is due to their higher wetting tendency.

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Few practical aspects for pollution reduction

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He also serves as visiting lecturer and examiner at renowned Textile institutes and various Management Institutes in India. He is a member of Textile Association of India and has published few papers in TAI Magazine. He was as active member of Rotary Club of Sholapur before shifting to Mumbai. He did many presentations on textile management and environmental aspects at various educational institutes and industries. This also includes a presentation at IIT, Mumbai on Pollution prevention in textiles. He has published articles on Industrial pollution & Role of Textiles in Textile Association India.

Cleaner production is the continuous application of preventative environmental system applied in process. This system reduces the adverse impact on environment and reduces the water pollution load during process. A checklist is presented here with an objective to identify and improve those areas which has the maximum impact on environment due to the textile industry. It is based on a comprehensive technical analysis of Indian textile industry and refers to currently available technologies. Environmental awareness and improved environmental standards amongst the top management in the industry results in a positive impact not only on the environment, but also on operational costs, product quality and company image. This method is a part of Chemical Management System.

For accomplishing in the areas of improvement, deep knowledge on the existing process is essential and one needs to study technical, environmental and economic implications along with performance parameters of the end product. It is a basic fact that, each dyehouse has its own system and technique to achieve desired results hence; the techniques discussed here as case studies are fit for any dyehouse with few customized modifications accordingly.

In this article, some basic steps to achieve desired quality of discharged effluent are discussed. It is always advisable to use minimum chemicals which have less pollution impact during the process before it is treated in ETP. This is called as reducing pollution load at the source.

Generally, discharge water from textile industry is expressed for environmental impact using following terms, pH, BOD, COD, TDS, hardness, bio degradability, etc. There are various conventional and upcoming methods described in various articles to improve the quality of discharged effluent according to the desired standards with minimum impact to ecology; viz. recovery of chemicals and its reuse, process and machine modification, use of biotechnology, use of membrane technology, etc. These all techniques are well discussed in various publications which are important and can definitely reduce pollution load in effluent generated.

In addition to the above techniques, one can try below mentioned methods to achieve reduction in COD and TDS by management of input chemicals.

Steps towards cleaner production

1. Add COD as one of the deciding factor while selection of new chemicals along with performance parameters and cost (give preference to chemicals having less COD with similar performance parameters)
2. Make a list of chemicals and test each chemical for COD (COD of 1% concentration)
3. Chemicals of similar function are compared for performance, dosages to be applied, rates (Rs/Kg) and COD.
4. Avoid high COD chemicals and replace them by low COD ones.

Some examples of similar chemicals with difference in COD are as under

5. Table 1 shows test reports which are actual results tested from particular bulk drums in one facility.

Table 1: COD values of Chemicals

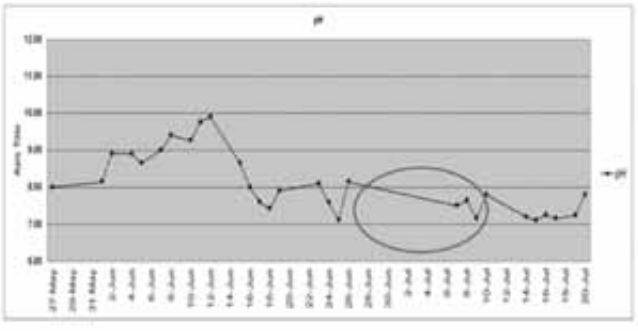
Sr. No.	Chemical Name	COD (1% solution)
1)	Liquid alkali	30
2)	Cationic soft	ener A 5010
3)	Cationic softener B	5366
4)	Cationic Softener C	4752
5)	De mineralizing agent A	875
6)	De mineralizing agent B	2508
7)	Dye bath conditioner	1818
8)	Dye fixing agent A	1457
9)	Dye fixing agent B	2080
10)	Dye fixing agent C	1077
11)	Gum A	830
12)	Gum B	1320
13)	Gum C	460
14)	Lubricant A	107
15)	Lubricant B	32
16)	Lubricant C	105
17)	Acetic Acid for neutralization	1020
18)	Citric Acid for neutralization	680
19)	Formic Acid for neutralization	240
20)	Non- ionic softener A	320
21)	Non- ionic softener B	715
22)	Non- ionic softener C	470
23)	Nonionic wetting agent A	1640
24)	Nonionic wetting agent B	680
25)	Scouring agent A	2280
26)	Scouring agent B	720
27)	Scouring agent C	4656
28)	Soaping agent A	960
29)	Soaping agent B	1901
30)	Soaping agent C	840
31)	Soaping agent D	664
32)	Soaping agent E	408
33)	Soaping agent F	3200

Each facility has different processes and selection criteria. It is required to develop own data for selection of chemicals. One can determine impact on COD with the help of various factors like,

- Average consumption per day and need to calculate Kgs of COD contribution per chemical in overall load.
- Processor can calculate the impact of COD for a particular process and decide to make necessary changes in process with proper care to maintain other parameters. (Pretreatment bath contributes highest COD hence it is advised to use enzyme base pretreatment with less alkali and can recycle the drain of pretreatment bath, washing bath and neutralization drains to reuse after proper tests.)
- Below graphs (Fig. 1, 2, 3) gives technical data (pH, TDS and Hardness) of collected scouring bath and its washes to be recycled.
- Below mentioned graphs (Figs. 1-3) gives indication about various bulk trials.
- Trial A - 2nd June to 15th June
- Trial B - 16th June to 25th June
- Trial C - 25th June to 6th July
- Trial D - 7th July to 13th July

  Various trials were taken by changing the chemicals each time to check its impact in the discharged bath.
- Trials of various chemicals taken during 25th June to 6th July seem to be ok for all parameters and can be continued. (Enzyme base treatment with reduction in NaOH)

Figure 1: pH of spent scouring baths tested during particular time period



Texttreasure

"Just when you think it can't get any worse, it can. And just when you think it can't get any better, it can."

- Nicholas Sparks, At First Sight

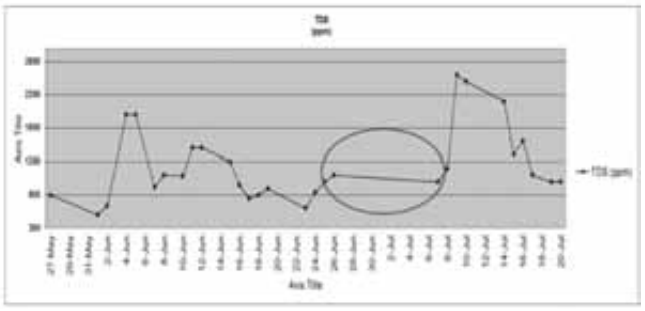


Figure 2: TDS of spent scouring baths tested during particular time period

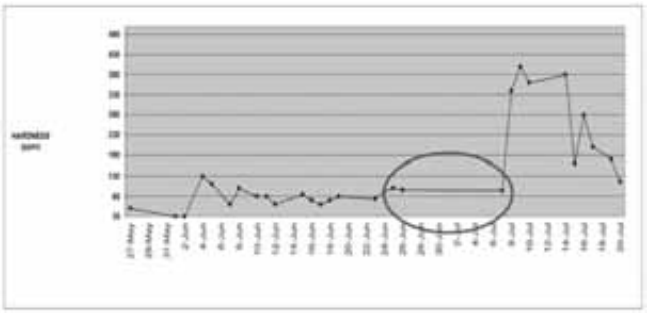


Figure 3: Hardness of spent scouring baths tested during particular time period

Reduction of TDS

In processing where reactive dyeing is contributing TDS which is not possible to reduce in primary and secondary treatment in ETP, the accepted standard is 2100 ppm whereas TDS of a dyehouse effluent is always higher. To achieve the desired norms, chemical management can help in various manners. Let us find out the chemicals which contribute maximum in TDS and decide action plan.

- Develop a chemical log containing average consumption of chemicals during last 3 months with their solid content.
- The impact of TDS from the chemicals which are absorbed by fabric in finishing are calculated with their effective load on effluent.
- The chemicals which get consumed during process like H2O2 are removed from list.
- Try to reduce the chemicals with higher impact on TDS and replace by better ones (like soda ash

Table 2: Case study of a knits unit

Depth of the shade %		Suggested by dyes supplier									Existing recipe in one knit dyeing unit											
											Recipe At Present				Recipe after modification 1				Recipe Under Trial 2			
Dye Class		RGB & Bi-functional			RGB & Bi-functional			RGB & Bi-functional			RGB & Bifunctional				RGB & Bifunctional				RGB & Bifunctional Final recp.			
Basic Data		Oreginal recipe			Trial 1			Trial 2 Bulk OK			Trial 3 Bulk Approved				Trial 4 - Bulk OK				Trial 5 To confirm in bulk			
Concentration	Expected pH	Salt	Soda Ash	NaOH	Salt	Soda Ash	NaOH	Salt	Soda Ash	NaOH	Salt	Soda Ash	Liq Alkali	NaOH	Salt	Soda Ash	Liq Alkali	NaOH	Salt	Soda Ash	Liq Alkali	NaOH
Upto 0.1%	10.5	20	5	0	10	5	0.2	20	5	0	10	5			5	5			5	5		
0.1% to 0.25%	10.5	20-25	7	0	20	5	0.2	20-25	5	0.6	10	5	0.5		7	5	0.5		5	5	0.5	
0.25% to 0.5%	10.6	20-25	10	0	30	5	0.2	20-25	5	0.6	15	5	0.5		10	5	0.5		7	5	0.5	
0.5 to 1.0%	10.8	25-40	10	0	45	5	0.2	25-40	5	0.9	20	5	0.5		15	5	0.7		10	5	0.7	
1.0% to 2.0%	10.9	40-50	15		60	5	0.5	40-50	5	1.2	30	5	1.4		25	5	1.2		20	5	1.2	
2.0% to 3.0%	11	50-60	15	0	70	5	0.5	50-60	5	1.5	50	5	1.7		40	5	1.7		35	5	1.7	
3.0% to 4.0%	11	60-80	20	0	80	5	1	60-80	5	2	60	5	2.04		50	5	2		40	5	2	
4.0% to 5.0%	11.1	60-80	20	0.5	90	7	1	60-80	5	2	70	10		2	60	5		2	50	5		2
Above 5.0%	11.2	80-100	20	0.7	90	10	1	80-100	5	2	80	10		2	70	5		2	60	5		2

Table 3: TDS reduction due to process modification (for knits)

Process 1						
% Shade	Below 0.5%	0.5% to 1.0%	1.0% to 2.0%	2.0% to 4.0%	Above 4.0%	Total
Quantity processed in Kgs	25000	30000	25000	15000	15000	110000
Salt GPL	20	30	40	60	80	
Na2CO3 GPL	10	10	15	20	20	
NaOH GPL	0	0	0	0	0.5	
Liquid alkali Albatex SA GPL						
Salt kgs	3500	6300	7000	6300	8400	31500
Na2CO3 Kgs	1750	2100	2625	2100	2100	10675
NaOH Kgs	0	0	0	0	52.5	52.5
Albatex SA Kgs	0	0	0	0	0	0
Total solids consumed in process						42227.5

Modified Process 2						
% Shade	Below 0.5%	0.5% to 1.0%	1.0% to 2.0%	2.0% to 4.0%	Above 4.0%	Total
Quantity processed in Kgs	25000	30000	25000	15000	15000	110000
Salt GPL	5	15	30	50	70	
Na2CO3 GPL	5	5	5	5	10	
NaOH GPL	0	0	0	0	2	
Liquid alkali Albatex SA GPL	0.5	0.9	1.4	1.7	0	
Salt kgs	875	3150	5250	5250	7350	21875
Na2CO3 Kgs	875	1050	875	525	1050	4375
NaOH Kgs	0	0	0	0	210	210
Albatex SA Kgs	87.5	189	245	178.5	0	700
Total solids consumed in process						27160
Reduction in TDS % due to process change						35.7

can be replaced by NaOH and Liquid alkali) Take proper care while development of labdips. (Below Table 2 shows case study of knits unit)

- From above Table 2, it is clear that instead of using higher dose of salt and soda, one can reach up to 25% reduction in solids and can reach close to desired norms of TDS. The following Table 3 shows target setting which can be achieved in production.

- Processor should calculate theoretical requirement of each chemical for each category of shade to achieve planned consumption of each chemical in a month. The data to be compared with actual consumption of each chemical (opening stock + receipts - closing stock).

- At one instance, it was observed that acetic acid consumption was quite higher in actual processing as against standard requirement. On observation, it was found that store operator was issuing 1 lit acetic acid in place of 1 Kg. After corrective actions, the difference in consumption was then reduced. Thus a detailed check must be done in order to avoid such mistakes.

- The excess consumption of each chemical is required to be studied and find a full proof solution to stop excess use.

Due to chemical management at input, many parameters of the discharged effluent can be improved. This reduces the effluent generation and also water consumption (in case of water recycling of selected baths). Actual results of a company can be seen from the Table 4 shown below,

It can be seen that, with a good chemical management system implemented in the process house; one can definitely reduce not only the cost of excess and/or unwanted chemical but also the effluent quality. Reduce, recycle and reuse must be the tagline of each company in order to minimize the pollution.

Table 4

Actual figures of water consumption & Effluent generation since Apr 2011													Test reports from CETP Test Results			
Month	Total Production Kgs/Month	Prodn Kgs/Day	Water quantity in Cubic Mtr/Month (As per MIDC bills)	Water received from MIDC qty in Ltr/day	Water used for Boiler Ltr/ Day	Water used for Domestic use Ltr/ Day	Water used for Industrial Cooling Ltr/ Day	Water used for Process Ltr/ Day	Effluent generated ltr/Day	Reuse of Effluent in process Ltr/Day	Effluent used for inhouse Plantation Ltr/Day	Effluent sent to CETP Ltr/Day	Test Result of COD	Test Result of BOD	Test Result of TDS	
Apr-11	147421	5670	16090	618846	123834	20000	10000	465013	418511	170101	30000	218410	**667**	**222**	**4234**	
May-11	140164	5391	16680	641538	117738	20000	10000	493801	444421	161728	30000	252693	**907**	**302**	**4491**	
Jun-11	112211	4316	15780	605385	94257	20000	10000	481127	433015	129474	30000	273540	**602**	**201**	**4085**	
Jul-11	131933	5074	15110	581154	110824	20000	10000	440330	396297	152230	30000	214067	**863**	**288**	**4401**	
Aug-11	84704	3258	11520	443077	71151	20000	10000	341926	307733	97735	30000	179998	**516**	**170**	**3458**	
Sep-11	92622	3562	12090	465000	77802	20000	10000	357198	321478	106872	30000	184606	**490**	**166**	**4455**	
Oct-11	76776	2953	12340	474615	64492	20000	10000	380124	342111	88588	30000	223523	**232**	**77**	**3242**	
Nov-11	66932	2574	10370	398846	56223	20000	10000	312623	281361	77229	30000	174132	**277**	**93**	**2730**	
Dec-11	82709	3181	11560	444615	69476	20000	10000	345140	310626	95433	30000	185192	**235**	**79**	**3270**	
Jan-12	57787	2223	9940	382308	48541	20000	10000	303767	273390	66677	30000	176713	**247**	**84**	**2556**	
Feb-12	59385	2284	8770	337308	49883	20000	10000	257424	231682	68521	30000	133161	**239**	**80**	**2791**	
Mar-12	79118	3043	9850	378846	66459	20000	10000	282387	254148	91290	30000	132858	**210**	**82**	**3103**	
Apr-12	106152	4083	13270	510385	89168	20000	10000	391217	352095	122483	30000	199612	**241**	**74**	**3312**	
May-12	113500	4365	10700	411538	95340	20000	10000	286198	257579	130962	30000	96617	**180**	**56**	**3104**	
Jun-12	77536	2982	9140	351538	65130	20000	10000	256408	230767	89465	30000	111303	**228**	**66**	**2811**	
Jul-12	69015	2654	7580	291538	57973	20000	10000	203566	183209	79633	30001	73576				
Total	1497965	57614	190750	7336538	1258291	320000	160000	5598248	5038423	1728421	480001	2830001	6135	2040	52043	
Average of First 6 Months	118176	4545	14538	559167	99268	20000	10000	429899	386909	136357	30000	220552	674	225	4187	Higher results
Average of Last 6 Months	82296	**3163**	10278	**395321**	**69087**	**20000**	**10000**	**296234**	**266610**	**94900**	**30000**	**141711**	**224**	**74**	**2946**	Improved results
Existing Legal Norms	120000 Kgs/Month			**805000 Ltr/Day**		**25000 Ltr/Day**	**20000 Ltr/Day**	**755000 Ltr/Day**	**507000 Ltr/Day**				250	100	2100	

A Series of Papers on Biotechnology and its Application in Textiles

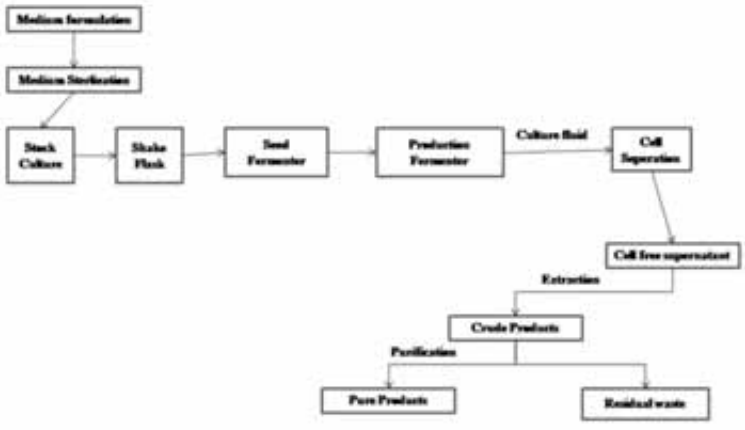
The series of chapters under the title, 'Biotechnology and its application in textiles' will be published in this Journal of the Textile Association over the next year or so, will introduce the basics of biotechnology, industrially useful biotechnologically derived products, their areas of application in textiles and recent advances in biotechnology for textiles.

This series is written primarily as an introductory text for an audience comprised of those interested in or already working in, textile related areas, who wish to acquire a broad knowledge of biotechnology and its application in textiles. The First Chapter is intended to serve as an introductory text for those who wish to expand their understanding of biotechnology.

Chapter 3: Fundamentals of microbial biotechnology

Manasi A. Damle, Madhura P. Nerurkar, Ravindra V. Adivarekar

In continuation with the earlier chapters in this 'Biotechnology series', the third chapter consists of the basic details required to carry out experiments in microbial biotechnology. The first chapter served as an introduction to biotechnology with its prominence on textile industry. The second chapter in series explained variety or range of industrially useful products from plants, animals and microorganisms through application of biotechnology. As discussed in earlier issues, generation of products from plants and animals through tissue culture or plant cell culture (PTC) and animal cell culture (ATC) is lengthy and tedious process as compared to microbes. Also PTC and ATC posses a great risk of microbial contamination. In this outlook, microbes have got an upper hand with context to generation of different biomolecules through biotechnology.



When one talks of microbial biotechnology it is inevitably fermentation which is being practised since ancient times. The earliest evidence of alcoholic beverages made from fruits, rice, honey, etc dates back to 7000-6600 BC. In our day to day life, process like curd making, etc are also a kind of fermentation carried out by natural bacteria present in the milk. Nature does not follow strict process conditions for growing such micro-organisms. When one wants specific product in pure form from particular microorganism then some protocols are needed to be followed. These basics of microbial biotechnology will be discussed in this chapter.

Steps involved in fermentation process are as shown in flowchart. As we proceed through this chapter while discussing fermentation steps, we will briefly elaborate different steps that are encountered in microbiological experiment.

Medium formulation

Microorganisms require nutrient medium for their growth. Nutrient medium essentially consists of carbon and nitrogen sources, salts and pH of medium adjusted to desired value. For growth of microorganisms, suitable selective medium is used such that the medium will allow growth of only specific type of microorganisms. Liquid medium refers to 'Broth' while the broth in which agar agar (solidifying agent) is added is known as agar medium. Microorganisms are grown in these culture media that contain a range of nutrients necessary for their growth. In a laboratory, culture media is contained within Petri dishes, test tubes, bottles and flasks.

Sterilisation

Once the medium is prepared, it is sterilized by autoclaving before conducting the experiments. Other

materials required for experiment like petri plates, conical flasks, test tubes, etc. are also sterilized using suitable methods. In textile field, while checking antimicrobial activity, the fabric/fibre samples should also be sterilized beforehand so as to ensure killing of microorganisms that thrive on fabric surface.

There are various techniques which are employed for sterilization, like, autoclaving, use of dry heat, gamma irradiation, etc.

Sterilisation is basically a process that kills all micro-organisms. Any physical or chemical agent that kills micro-organisms is said to be biocidal. Autoclaving is a technique that kills micro-organisms using pressurised steam. In a laboratory, materials that are to be used for experiment are sterilised in autoclave at 121^0C at is lbs presure for 15 min. This temperature ensures killing of microorganisms (as their enzymes and protein are denatured) and even endospores that can sustain high temperature. The autoclave should be loosely packed so that the steam can circulate around the objects so as to heat them to the correct temperature. It is used to sterilise objects and materials that are heat resistant such as glassware, cloth, rubber, metallic instruments, liquids, paper and heat-resistant plastic. Medium used for growth of microorganisms is also sterlized using autoclave.

Dry heat kills micro-organisms by dehydrating them and denaturing their proteins. Higher temperature i.e. 160^0C for two hr is needed for sterilisation when using dry heat as compared to using steam. Dry heat is used to sterilise items that may be adversely affected by steam, such as powders, oils, glass pipettes and metal instruments that may corrode if exposed to moisture. Dry heat is not suitable for plastic, cotton, paper or for solutions that would boil and dry out, such as culture media.

Membrane Filtration is the method used to sterilize heat sensitive liquids. It is used to sterilise solutions such as antibiotics and enzymes. It is also used to sterilise air, for example before it is pumped into a fermenter.

Another technique used for sterilisation is gamma irradiation, where Gamma rays kill micro-organisms by causing lethal mutations in the DNA that cannot be repaired. It is used to sterilize plastic material such as syringes, petri plates and surgical gloves.

Disinfection

Disinfection refers to a process where a chemical agent (disinfectant) is used to destroy micro-organisms but not endospores. Disinfectants do not normally achieve sterility because they do not always kill all micro-organisms present. However, they do reduce the number of micro-organisms to safer levels. In the laboratory, disinfectants (alcohol, Phenolics) are used for a variety of purposes such as swabbing a bench (working place) before and after use, for the sterilisation of surfaces, and for the disposal of used instruments such as of tips of micropipette, forceps, spreader, etc.

After sterilization, the medium is ready for inoculation (injection) with microorganisms. For this following steps are needed to be followed.

Isolation and culturing of microorganisms

Desired microorganisms are first isolated from a particular sample (air, water, soil, food etc.) and are essentially maintained in pure form in laboratory. An alternative and fast way is to directly procure a culture banks where they are maintained and already preserved in pure form. Few names of such culture banks are, Microbial Type Culture Collection (MTCC), American Type Culture Collection (ATCC), National Collection Industrial Micro NCIM, etc. These institutes maintain a catalogue of different microorganisms.

There are certain terms that are needed to be kept in mind while working with microorganisms.

To culture a micro-organism in laboratory, a sample (called as the **inoculum**) is introduced into a culture medium that provides an environment in which they can multiply. The culture medium is said to be the food for the micro-organisms to grow. The observable growth that appears in the medium is known as a **culture**. A **pure culture** is one that contains a single known species or a type of micro-organism. This type of culture is most frequently used for the study of micro-organisms in the laboratory.

Micro-organisms are transferred from one culture medium to another, a process known as sub-culturing. Sub culturing is carried out in order to maintain a culture in its pure and active form. This is required from time to time to preserve the culture.

For fermentation, a pure culture is used as inoculum; this is called as **stock culture**. A stock culture is basically known as a source of pure culture which helps for long term preservation of the pure culture. This stock culture is preserved at 0 - 4^0C. From this stock culture, small portions of culture are transferred to the growth medium and are incubated at shaking condition for required time period (minimum 24 hrs.). This is done to get an actively growing culture.

Laminar air flow

Experiments involving inoculation of medium with microorganisms or subculturing are performed in a safety cabinet; also known as laminar air flow. Level of safety required depends on type of microorganisms that are being handled. Generally there are four types of Biosafety levels that are specified. For academic purposes and preliminary studies in textile field, safety cabinet with Biosafety level 1 is sufficient. Experiments are performed in laminar air flow where air that is circulated is purified using High efficiency particulate air filter (HEPA) so as to prevent aerial contamination of microorganisms. Experiments are performed in between two burners where the aseptic zone maintained; as it helps in prevention of contamination in the medium. After experiments are over, samples are incubated in incubator for growth of desired microorganisms at ambient temperature and humidity.

The actively growing culture is then transferred to the seed fermenter.

Seed fermenter

It is a large tank containing previously sterilized nutrient medium. Seed fermentation allows the culture/micro-organisms to reproduce and adapt to the environment and nutrients that they will encounter in production fermenter.

Production fermenter

Following seed fermentation, the culture/micro-organisms are transferred to a larger tank i.e. the main fermenter, where temperature, pH, and dissolved oxygen are carefully controlled for optimum production of desired products. Additional nutrients may be added to enhance the productivity. When the fermentation is complete, cells (micro-organism), growth medium and product (cell free supernatant) are essentially separated and the product is subjected to purification.

At pilot scale (at laboratory level), fermentation is carried out in flask where the pH of medium is adjusted. After inoculation of sterile medium with desired pure culture (carried out inside laminar air flow), growth of microorganisms is allowed in an incubator. For bulk production of products, a fermenter is used once physical (pH and temperature) and chemical (carbon source, nitrogen source, etc.) process parameters are optimized at the lab scale.

Microbes can be both beneficial and harmful. Beneficial microbes are used in fermentation for generation of useful products while harmful microbes need to be killed. The agents which have antimicrobial activity needs to be tested against particular types of microorganisms. Experiments involving antimicrobial activity of particular sample against microorganisms are performed in laminar air flow. For this too, sterilization of nutrient medium and apparatus is prerequisite. After experiments, incubation of microorganisms is allowed in an incubator. Lastly after recording results, culture medium (broth or agar medium) needs to be sterilized using autoclave in order to kill microorganisms that have been grown. This is then followed by thorough washing and cleaning of apparatus. The process flowchart needs to be followed for every microbiological experiment.

Use of basic techniques is mandatory for obtaining growth of a particular microorganism (or a pure culture) and also to assure safety to prevent contamination of working personnel or the environment. These techniques have been developed to control the unwanted growth and spread of micro-organisms.

This chapter provided a basic and brief methodology that should be followed for microbiological experiments. In the upcoming chapter light will be thrown on microbial products which find end use in textile industry with emphasis on enzymes.

About the Authors

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ABIL Pune Fashion Week'13 starts with a spectacular showcase by some of India's finest designers

Touted as one of India's finest and Pune's premier fashion week, ABIL Pune Fashion week is back with another season of glitz, glamour and above all fashion at its finest. The first day of ABIL Pune Fashion Week showcased some of India's most celebrated designers such as Vaishali S., Shweta Kapur, Shipra Malhotra, Swati Vijaivargie Jain, Shivan & Narresh and Paras & Shalini of Geisha Designs.

Raising the curtain of the 4th season of ABIL Pune Fashion Week was designer Vaishali S. with her traditional yet contemporary collection celebrating her travels through India. Be it the Chanderi Silks of Madhya Pradesh or the Paithinis of Maharashtra. In contrast to Vaishali S.'s traditional designs, designer Shweta Kapur's collection 'Surgery' under her label 431-88. 'Surgery' was inspired by a range of references which included various surgical procedures and a hint of Fernando Vicente's anatomical work. Dominated by wool, acrylic, leather and crepe in colours like grey, brown and black with a touch of brighter colours, Surgery was a perfect juxtaposition between sober and vibrant.

Showcasing later in the evening were designers Shivan&Narresh. Their Naïve art inspired cruise collection was a work of art in itself. Using juvenile colours and an absolute play of proportions, the collection depicted the innocence of a child. Topping this heady cocktail of high fashion, the cherry of the evening was the last show of the evening presented by designers Paras & Shalini of Geisha Designs. Inspired from the sea, the collection included sporty, clean cut silhouettes which contrasted with flowy romantic drapes, ballerina skirts and the likes. Balancing pastels with bold colours and neons, the collection was simple and elegant with designs which would suit the younger, bolder woman of today.

Speaking on the commencement night, **Badal Saboo, Managing Director, ABIL Pune Fashion Week** said, "Over the last few years, ABIL Pune Fashion Week has established itself as one of the finest showcases of fashion this country has to offer. We have always strived to not only showcase the work of the best of the best in fashion but also bring out newer talent. This year we have just go bigger and better, bringing together a combination of great talents and designs."

The designers showcasing today were showcasing for Studio Rudraksh, Pune, a multi-designer studio offering an array of collections from over 80 well known designers. The evening was attended by well known socialites like Parul Mehta, Shyreena Agarwal, Arun Khanna with wife Rupa Arun Khanna, Sonal Prasad, Meenal Mehta and others. Showcasing on day 2 of ABIL Pune Fashion Week are Riddhi & Siddhi for their label MapxencaRS, Mona Shroff, Nitya Bajaj, Nachiket Barve and Nivedita Saboo.

Day two of ABIL Pune Fashion Week'13 presented the audience with a spectacular show of fashion at its finest. The evening was filled with showcases by designers Riddhi and Siddhi for MapxencaRS, Nitya Bajaj, Nivedita Saboo, and Nachiket Barve as well as jewelry designer Mona Shroff.

Opening the evening with their futuristic collected inspired by the architectural works of renowned architect Zaha Hadid, designers Riddhi and Siddhi showcased edgy and structured designs from their label MapxencaRS. Combined with classic vintage jewelry by Mona Shroff, the show was a beautifully blended poetry of the eras passed and those yet to come. Riddhi and Siddhi's designs comprised of stiff and structures silhouettes with classic outfits given an edgy twist. Comprising of colors such as electric blues and fuchsia pinks the collection set the bar for the rest of the evening.

Taking the evening forward was Delhi based designer Nitya Bajaj showcasing her collection "Ressurect". It depicted a celebration of womanhood where romanticism and baroque elements were interpreted into the collection of swim dresses and evening gowns. A celebration of femininity, the collection included a lot of floral depictions through thread work, digital prints, lacework etc. Nachiket Barve for Rudraksh, followed next with his collection "Fossil", a collection comprising of modern silhouettes such as crop tops, cuffed crop pants, palazzo pants, and oversized jackets, all embellished with intricate bead work and gossamer like

embroidery, wrap dyeing in summery neutral shades. The collection boasted of fabrics such as silk, chanderi, chiffon, crepe, georgette, organza, cotton, lurex, dupion etc. coming together in combinations for the range.

The evening was wrapped up in a perfectly woven tapestry of exquisite fashion and designs by designer Nivedita Saboo's collection "The Roman Rendezvous". The collection is a translation of the breath-taking beauty and grandeur of Roman art and architecture visible in the artistic dome paintings, handcrafted sculptures and solid rangy pillars. The collection flaunts structured silhouettes juxtaposed against fluidity in drapes. Inspired by artistic baroque intricacies, Nivedita's Roman Rendezvous showcased surface development techniques like foiling, fabric texturisation and customized print development in coherence with more traditional techniques such as innovatively used block printing and hand embroidery. It was a perfect amalgamation between the orient and occident woven together where elegance is the essence of the moment. The mood of the collection comes together through the hues of Roman influences which are pearled ivory, marble grey, graphite grey, charcoal grey, bright marigold gold, Pompeian red, coppery rust, honey mustard, angel blue, nautical blue & twilight blue.

The evening was attended by eminent personalities of Pune like Mr. Amit Bhosale, Mr Sanjay Ghodawat, Atul Goel, Varsha Chordia, Sunetra Pawar, Nichola Pawar, Parul Patel, Monica Trivedi, Minocher Patel, Vandana Shah, Sabina Sanghvi and many others.

After two days of high fashion, glitz and glamour, the final day of ABIL Pune Fashion Week's 4th season was a spectacle of jaw dropping, enthralling and absolutely astounding fashion. Bringing the fashion week to a close, the final day of the fashion week had showcases by designers Mayank Shraddha, Dinesh Malkani, Raj Shroff and finally bringing in the finale were ace designer duo Falguni & Shane Peacock.

Opening the evening with their collection "Autumn in Midnight" designers Mayank and Shraddha showcased a collection inspired by the colours of fall, viewed through the eyes of an artist suffering from insomnia. Colors like Navy, black, oxblood, bottle green and Ochre Yellow dominated the palette. The collection comprised of materials that were both matte and metallic with Tussah Silk from West Bengal juxtaposed with Khand from Maharashtra and accented with high gloss leather in flowing layered silhouettes.

Taking the evening forward was Mumbai based bridal couture designer Dinesh Malkani. Showcasing traditional couture line with an artful juxtaposition of Indian and fusion styles. The designs had contemporary motifs with the right touch of Indian embroidery to give it a royal look, exuding the kind of grandeur that is synonymous with the designer himself. The show concluded with appearance of Poonam Pandey. Later in the evening, Raj Shroff, a Bangalore based designer showcased his collection "Ravage". The collection reflected the new global Indian, with influences from art and culture. The label depicted sensibility towards fashion and texture and was the mirror image of a thinking woman.

The Finale show was put up by none other than the truly international Indian designer duo Falguni & Shane Peacock which just got better as Neha Dhupia showed up with a grand entry as the show stopper.

Pleased with the success for Season 4, Mr. Badal Saboo, Managing Director, ABIL Pune Fashion Week commented, ***"We are extremely happy with the response we have received this year. Pune is a booming market and the successful reception given to this season of ABIL Pune Fashion Week just proves that. We are honored to be the platform wherein new avenues of fashion & related businesses have got the opportunity to blend in together, thus, making it the most celebrated event in social calendar of the city. We are already looking forward to the next season and promise to bring yet another fabulous week of fashion, glamour and grandeur next year."***

The evening was attended by who's who of the town like Avinash & Gauri Bhosale, Yohan Poonawalla with wife Michelle Poonawalla and Zavaray Poonawalla, Mubaraka Kuvawala, Neerav Kinnari Panchamia, Tarun Sharma & wife Reshma Gupta and others.

As the Fashion Week gets grander year on year, it has been supported & sponsored by eminent brands like ABIL as the title sponsor along with Ganga Florentina, Xrbia, Audi, The Quintessential, Sun n Sand, Swan Group and The Westin as hospitality partner. The event was indeed a full house show with an overwhelming response that it received from the very first show of the day.

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ABIL Pune Fashion Week is an initiative taken by the creative thinkers of the industry - Nivedita and Badal Saboo to bring together a fashion extravaganza in the cultural city of Pune. As the city reaches out to the world through its ever growing educational, commercial and cultural activities, it invites a spectrum of young minds and new trends. Catering to their unique styles, new manifestations of fashion have been evolving here. Therefore, the city is definitely not a market to be missed by the fashion fraternity and ours is the fashionable step to integrate all the sectors through the fashion week.

With a vision of crafting a show that matches international standards, ABIL Pune Fashion Week was welcomed and supported by the fashion fraternity, corporates and fashion aficionados alike. It also benefitted from senior mentor designers who contributed in the successful establishment of the property. Thus, the city got its 1st official Fashion Week property in the year 2010. And as rightly recognized, ABIL Pune Fashion Week today stands as the 3rd best hosted Fashion Week nationally.

ABIL Pune Fashion Week has been growing from strength to strength each year and has already become a sought- after event in a short span of time. In keeping with its commitment of building relationships, creating opportunities and encouraging excellence in quality to redefine the future of fashion in India, ABIL Pune Fashion Week presented - Season 4 on the 8, 9 &10 November 2013. ABIL Pune Fashion Week does not only provide a platform for nurturing designers in the city, but it is also an exclusive opportunity to rub shoulders with the most celebrated names from the world of fashion and glamour.

The event has indeed arrived with a brand new look and promises a never-before experience for Pune's fashion conscious elite. In Season 4, we are stepping up to showcase the superlatives in creativity by celebrated designers like Dinesh Malkani, Falguni & Shane Peacock, Mona Shroff, Nachiket Barve, Nitya Bajaj, Nivedita Saboo, Paras & Shalini, Raj Shroff, Riddhi Siddhi, Shweta Kapur, Shraddha & Mayank, Shipra Malhotra, Shivan & Narresh, Swati Vijaivargie Jain and Vaishali Shadangule. An enthusiastic and dedicated ABIL Pune Fashion Week team is working seamlessly with well known industry experts like Lubna Adams as the Choreographer and Vipul Bhagat as the Hair & Make-up artist. Together this team contributes to make it a world class event.

Realizing the scope and demand of many internationally recognized designers seeking to explore the market and vice versa, the focus of Season 4 would be to bring together professionals from various segments of the industry to unravel the potential business and retailing opportunities.

Season 4 showcased the collection of the above designers to the crème-de-la-crème of Pune & Mumbai in full attendance. This grand and opulent event will most definitely have left the spectators mesmerized! With a captive audience that is truly a class apart; the event capitalized on the fast growing business potential of the city. The event catered to niche audience, where entry was restricted through invitations only.

ABIL Pune Fashion Week Season 4 was an experience to cherish and solicit the valued patronage of its viewers in making it an event to remember!

A.T.E. launches "ATEeStore"

To offer convenience and faster service to its customers, A.T.E. has launched its e-commerce portal, '**ATEeStore**', to enable customers to order products online. ATEeStore can be accessed through the company's website http://www.ateindia.com.

To start with, the ATEeStore is available for sale of A.T.E.'s TeraSpin spinning machinery components. The company will include other products in the ATEeStore in a phased manner.

The 1st phase of the ATEeStore covers instant quote generation and order placement online, with automated email confirmation, immediate updation of despatch details, tracking of order status, etc. A.T.E. is also working towards extending the ATEeStore to facilitate online payment.

Products in the ATEeStore are categorized for easy search, i.e., the site allows to search the product by 'Category' (a quick search tool that connects to the products needed with just a click) or by use of the "Select Product" tab (which needs only the entering of part of the name of the product).

The user manual uploaded in the ATEeStore under the 'Help' menu provides a step by step guide on using and navigating the ATEeStore.

Customers may send their queries, if any, to: estore@ateindia.com.

"Birla Spunshades" Offers Water Conservation, Unfading Colours and Uniformity

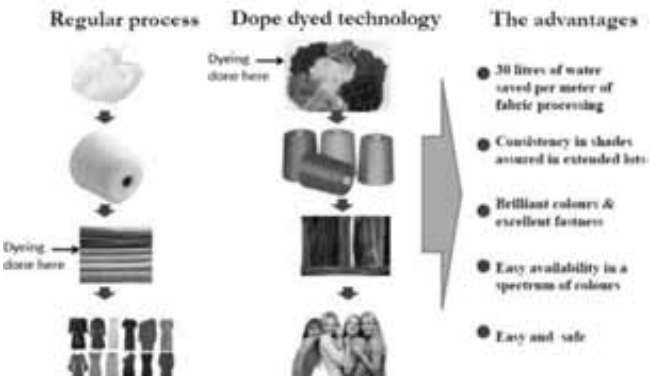
The Aditya Birla Group is in the League of Fortune 500. It is anchored by an extraordinary force of over 136,000 employees belonging to 42 different nationalities. The Group has been ranked Number 4 in the global 'Top Companies for Leaders' survey and ranked Number 1 in Asia Pacific for 2011. 'Top Companies for Leaders' is the most comprehensive study of organizational leadership in the world conducted by Aon Hewitt, Fortune Magazine, and RBL (a strategic HR and Leadership Advisory firm). The Group has topped the Nielsen's Corporate Image Monitor 2012-13 and emerged as the Number 1 corporate, the 'Best in Class' Birla Cellulose is the Aditya Birla Group's umbrella brand for its range of cellulosic fibres. It comprises versatile sub-brands; Birla Viscose, Birla Modal, Birla Excel and Birla Spunshades. These brands offer a wide range of functional benefit such as soft feel, high moisture absorbency, bio degradadbility and comfort to the wearer.These fibers have multiple applications including apparel, home textiles, dress material, knitwear, non-woven etc.

"Spunshades" is a brand name for the spun dyed viscose by Birla Cellulose.

Birla Spunshades is the registered brand name for the spun dyed viscose manufactured by Birla Cellulose. Spun dyed viscose has numerous environmental benefits vs the normal piece dyeing route of the fabric.

The pigment for dyeing is injected into the viscose solution prior to spinning stage of the viscose staple fibre.

Birla Spunshades are available in a wide range of colors. Spunshades has the most vibrant and delightful color palette with unmatched fastness.



The advantages:

Conserves water: Birla Spunshades uses a dope dyeing technology at fibre stage that saves 30 liters of water per meter of fabric unlike the conventional dyeing (piece dyeing) that requires large amount of water consumption and spreads color pollution.

Unfading colors: During conventional piece dyeing, the dye chemicals attach themselves to the surface and hence with repeated washing and abrasion, these colors fade away. Manufacturing process of Birla Spunshades involves injection of pigment dyes in the fibre production. This ensures deep colors seeded inside every strand resulting in longevity of colors.

Uniformity across lots: A key advantage of Spunshades fibre is the color uniformity that it gives across batches.

Dr. N.N. Mahapatra VP of ACTI

Dr. N.N. Mahapatra

Dr. N.N. Mahapatra, Vice-President, Business Development, Colorant Ltd, Ahmedabad was recently appointed as Vice-President of (ACTI) Association of Chemical Technologists (India), It was no surprise to many who know him since he already has a string of awards and positions attached to him. Mahapatra, who has 29-years of experience in textile industries in India and abroad, has worked with Birlas & Ambanis corporates apart from Raymond, GSL and LNJ Bhilwara. Dr. Mahapatra has a BSc (Tech) in Textile Chemistry, MSc and a Doctorate apart from an MBA.

In 2007, Dr. Mahapatra was also awarded the C Col FSDC (UK) and C Text FTI (Manchester). In 2008, he was awarded the FTA from the Textile Association (India) and FIC from the Institution of Chemists, Kolkata. In 2009 he was awarded the FIE from the Institution of Engineers (India). He is Vice Chairman of the Textile Association (India) for the term 2011-2015. Dr. Mahapatra, who has implemented many new technologies, has also been a member of many big institutions and has contributed in more than 170 papers in textile journals in India & abroad.

Ms Shashi Singh, ITTA Chief

Ms Shashi Singh

There is no technical textile event without her presence and there are no technical textile statistics not known to her! Ms Shashi Singh, who heads the Indian Technical Textiles Association (ITTA) as its Executive Director since August 13, 2012, is a professionally qualified Chartered Management Accountant (UK) and has experience of about 25-years in textile industry including 10-years in technical textile industry. She had a stint as Joint Textile Commissioner and during her tenure in Office of the Textile Commissioner, Ministry of Textile. She was instrumental in formulation and implementation of highly successful Technology Upgradation Fund Scheme (TUFS). She was also associated with the formulation of the textile policy and schemes related to technical textile industry, ie, Scheme for Growth and Development of Technical Textiles (SGDTT), Technology Mission on Technical Textiles (TMTT). She also handled the issues related to fiscal levies, WTO, DATA Bank of Textile Industry.

Ever Expanding India-Hong Kong Bilateral Trade Relations

HKTDC Trade Fairs Offer One-stop Marketing and Sourcing Platforms

India has been a significant trading partner of Hong Kong. In the first nine months of 2013, the total trade value accounted to US$16.9 billion, increased by 6.9% year-on-year. India has become the fourth largest export market for Hong Kong. Hong Kong's total exports to India amounted to US$8 billion for the period. Reciprocally, India was Hong Kong's seventh largest source of imports in the first three quarters of 2013. Hong Kong's imports from India reached US$8.8 billion for the period.

Benjamin Chau, Deputy Executive Director of the Hong Kong Trade Development Council (HKTDC), the statutory organization responsible for promoting Hong Kong's external trade, remarked at a press event held in Mumbai, India, "We are glad to see that India has been growing to one of Asia's most significant countries. India's middle class is expanding with increasing spending power which generates tremendous trade opportunities and poses great impact on the regional economy." The World Bank forecast Indian economy to grow at 4.7% in the current financial year of 2013 and accelerate to 6.2% in the financial year of 2015.

Mr. Benjamin Chau, Deputy Executive Director & Mr. Rajesh Bhagat

India has been one of Hong Kong's major sources of imports as well our important export market. The bilateral trade between two economies is particularly strong at industries including precious & semi-precious stones, jewellery, electronics, IT, and textile, all of which are leading industries in this booming country.

HKTDC Trade Fairs - One-stop Marketing and Sourcing Platforms

Hong Kong is the region's trade fair capital. In 2013, the HKTDC put on 35 international fairs. Out of them, 30 were merchandise-based trade fairs or public events.

The 30 fairs have attracted some 32,500 exhibitors, up around 2% over 2012; around 680,000 global buyers, up 7.4% over 2012, achieving record-breaking results. The figures not only speak for themselves of their scales but also imply immense trading opportunities.

Nine of the HKTDC international trade fairs are the largest of their kinds in Asia, and three are the largest of their kinds in the world. Those three are the Hong Kong Gifts & Premium Fair, Hong Kong Watch & Clock Fair, and Hong Kong Electronics Fair (Autumn Edition).

"Our international fairs attracted buyers from around the world. In 2013, the numbers of overseas and emerging buyers recorded a year-on-year increase of 5.4% and 2.8% respectively," Mr Chau said. "Notably, buyers coming from emerging markets to HKTDC fairs for product sourcing are increasing, 8,475 buyers of which came from India, representing a 5% growth."

Likewise, for exhibitors, there was also an increase in the number of exhibitors coming from India to tap into the opportunities. 706 Indian exhibitors leveraged in 2013, on our platforms to expand their business contacts.

These findings indicate that more companies coming from emerging markets are increasingly riding on HKTDC fair platforms to directly market their goods and services to the hands of global buyers.

The HKTDC trade fairs have been playing a key role in bolstering bilateral trade relations between India and Hong Kong. "We encourage the Indian enterprises to capitalize on the international trading opportunities our trade fairs offer to reach out to the massive global buyers and tap into other flourishing markets in Asia as

well as the Chinese mainland," Mr Chau added.

Portfolio of Relevant Fairs for India

The HKTDC will stage major fairs, which are related to India's leading industries, namely Hong Kong International Jewellery Show, Hong Kong Electronics Fair & International ICT Expo, Hong Kong Fashion Week, World Boutique, Hong Kong Houseware Fair, Hong Kong International Home Textiles & Furnishings Fair, Hong Kong Gifts & Premium Fair, Food Expo and Hong Kong International Tea Fair and many more.

Supported by quality international exhibitors and buyers, the HKTDC trade fairs can surely provide traders with one-stop sourcing and marketing platform. Buyers and exhibitors can capitalise on the opportunities to gather the latest market intelligence, and most important of all, to form partnerships and expand business network.

"With closer collaboration between India and Hong Kong, and with our concerted effort, I am sure a stronger bilateral trade relationship and more business opportunities will be developed. We, HKTDC, will continue to assist in bolstering bilateral trade relations between India and Hong Kong," Mr Chau concluded.

INDIA - HONG KONG Trade Overview

Indian exports to Hong Kong primarily include pearls, precious & semi-precious stones, electrical machinery, leather, cotton, fish & crustaceans, silk, copper, organic chemicals, machinery and plastics while Indian imports from Hong Kong include pearls, precious and semi-precious stones, electrical machinery, machinery, optical & medical instruments, clocks & watches, miscellaneous manufactured articles, plastic and articles thereof.

View of Press Meet at Taj Mahal Palace Hotel, Mumbai, India

Foreign Direct Investment to India from Hong Kong has been increasing in recent years. Hong Kong is also a major sourcing centre for Indian companies and it has emerged as a major re-exporter to Mainland China of items it imports from India.

For the first nine months of 2013 as a whole, value of year-on-year increases of total exports to India were up 6.1%, while the values of imports from India also were up 7.6%.

Currently, there are about 1,500 Indians companies operating in Hong Kong and their numbers are expected to rise tremendously in the coming months.

According to HSBC analysis India may replace Japan and Germany in the rankings of Hong Kong's top five trading partners by 2030 if the city's exports to the two countries continue to grow at their current pace. India would be the driver of Hong Kong's export growth in the next three years, which the bank forecasts at 11 per cent per annum.

The Hong Kong Jewellery and Jade Manufacturers Association said that India became the third-largest destination for Hong Kong's jewellery exports in 2012, with an export value of HK$4.9 billion. Statistics from the Trade and Development Council show that the export value of precious stones to India jumped by more than half each year from 2006 to 2011.

About the HKTDC

A statutory body established in 1966, the Hong Kong Trade Development Council (HKTDC) is the international marketing arm for Hong Kong-based traders, manufacturers and service providers. With more than 40 global offices, including 12 on the Chinese mainland, the HKTDC promotes Hong Kong as a platform for doing business with China and throughout Asia. The HKTDC also organises trade fairs and business missions to connect companies with opportunities in Hong Kong and on the mainland, while providing information via trade publications, research reports and online.

Texttreasure

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

- George Bernard Shaw

Witness THE FUTURE OF FASHION in action at InFashion 2014

The most anticipated International Textile and Fashion Ingredient Innovation Show scheduled on 17,18 January, 2014 at Bombay Exhibition Center, Goregaon, Mumbai.

InFashion-2014 - International Textile and Fashion Ingredient Innovation Show, (Exhibition, Workshops, Conference & Awards)

InFashion is the one event in India which invites the entire textile, apparel and fashion community to come together to buy, source and view all that matters in the world of fabric retailing, creating good fashion clothing and apparel.

It's the only place where retailers, garment manufacturers and exporters, apparel brands and labels, merchandisers, buying houses and buying agents, fashion designers, wholesalers and distributors and importers from across India and South Asia can be a part of the Innovation, ideas and passion for fashion. Focusing on the future developments in the industry; the show is sure to dazzle all.
The exhibition being organized in Mumbai is proposed to be an event catering toward the ever changing trends and innovations being executed by the leading players of Textile and Apparel Sector in India. It is an important platform for conducting business, networking and staying up-to-date with the latest trends and innovations across the world.

InFashion is being held with the support of all the major trade associations and trade bodies to offer maximum value to the industry and create opportunities for growth in this sector the market for which is growing exponentially. The major supporting associations include FAITMA, Bharat Merchants Chambers, Textile Association of India, Federation of Knitwear Textile and Allied Industry Associations, Hindustan Chamber of Commerce, Bombay Yarn Merchants Association & Exchange Ltd., Knitwear Club., Southern Gujarat Chamber of Commerce & Industry, The Synthetic & Art Silk Mills' Research Association.

InFashion announces Birla Cellulose as a leading partner for InFashion 2014 creating a unique and complementary platform for Birla Cellulose to showcase its leadership position and to educate and create awareness for new launches. Birla Cellulose as an important player in the industry will be using this platform to showcase the recent developments.

The Exhibitors profiles are rich in terms of not only the players that are participating but the diversity in terms of their backgrounds. The exhibitor's profile covers the entire value chain of Textile and Apparel sector and showcases the most diverse range of new and innovative fashion ingredients and services. Leading companies from Fibre, Yarn, Fabric, Textiles, Trimmings & Embellishments, CAD/CAM applications & Services are participated.

InFashion highlights

- International Exhibition: Showcasing latest Innovations in Fibre to Fashion creation
- Trends4INDIA: Trend presentation for India. Autumn-Winter 2014 and Spring-Summer 2015
- Workshops on Trend Forecasting, Design Inspirations, Runway Interpretations, Visual Merchandising etc.
- InFashionLIVE: Global Brands on the ramp together with textile majors
- Images Fashion Awards: Felicitation of outstanding achievers in the Business of fashion

Specially crafted Workshops

InFashion in its 4th edition apart from a dedicated fabric and textile show is now a broader concept of "Design, Trends & Sourcing. It includes the especially crafted InFashion workshops for profiles like merchandisers, fashion designers, purchasers, sourcing heads, buyers, exporters, product developers and RMG manufacturers.

The topics to be covered include: Fashion Creation, Fashion Innovation, Fashion Forecasting and Fashion Ingredients Innovation.
The Industry has embraced the show with open arms and the need for the industry to create a platform such as this could not have been more evident, major leading companies have confirmed their participation and

are extremely enthusiastic about InFashion 2014. The organisers of InFashion are optimistic and add "It is our belief that by prioritizing and understanding the needs of the industry and specifically the trade visitors, we fulfill the demands of our exhibitors and partners."

Images Group

An IMAGE is headquartered in Delhi with offices across Indian Metros and in the Middle East. Among our target audience, the IMAGES are trusted as the catalyst for profitable growth of modern retail through knowledge platform leadership. Since 1992, Images has been operating a strong portfolio of B2B publications that covers all verticals of retail and has served to inform advice & inspire leaders and decision makers of the industry.

The need to connect with businesses, people, knowledge and ideas associated with modern retail is served by IMAGES Business Exhibitions and networking meets. Conducted alongside the Expo's, Images Knowledge Forums and Conferences featuring global leaders inspire not just debate and discussion, but policy decisions too.

On behalf of our Exhibitors, Support partners and the organizing team of InFashion 2014 hereby takes the opportunity to invite you for this EVENT. We assure you that the exhibition will fulfill all your expectations duly and will help in opening up new prospects for the betterment of the Industry.

Formore information, contact:
Mobile: +91 9999 251621
E-mail: adarshverma@imagesgroup.in

ITMACH 2014 getting wide exhibitor and user industry

ITMACH 2014 exhibition are getting warm response from exhibitors as more number of exhibitors is showing interest to be a part of the event. After the announcement of the event in August end, so far over 45 exhibitors have confirmed their participation in ITMACH 2014.

Being the first focused Textile Machinery and Accessories exhibition of Western India, that too in Bhiwandi, exhibitors' interest to meet this vibrant industry has grown substantially. Primarily, machinery and technology providers from the post-spinning, weaving preparatory, weaving, dyeing, printing and processing as well as garmenting sectors are booking space in the show scheduled from January 22-24, 2014.

Few of the prominent machinery suppliers that have confirmed participation at ITMACH 2014 are Picanol, Staubli, A.T.E., Luwa, Kuesters Calico, Aesa, Wan Li, Tai Sang, Texworld, Yamuna and Best Air etc. Also, the exhibition is supported by leading industry associations like FAITMA, SASMIRA, ITAMMA, DKTE and industry media.

In addition, local textile manufacturers associations of Bhiwandi and around have extended their cooperation and extensive support to make ITMACH 2014 a highly participated exhibition and meeting place for business. The enthusiasm building for the event is due to the recent announcement of industry friendly policy under RR-TUFS and Maharashtra Textile Policy that aims to benefit the industry.

The exhibition venue being located on the National Highway 3 and on the periphery of Mumbai city limits this offers easy accessibility to the exhibitors and visitors from Mumbai and Navi Mumbai.

For Contact,
info@itmach.com

Texttreasure

"I wanted a perfect ending. Now I've learned, the hard way, that some poems don't rhyme, and some stories don't have a clear beginning, middle, and end. Life is about not knowing, having to change, taking the moment and making the best of it, without knowing what's going to happen next."

- Gilda Radner

INVISTA and Lenzing work together to bring improved performance to denim fabrics

Paris/France, 27.11.2013 - INVISTA, owner of LYCRA® fibre, and Lenzing, a leading producer of man-made cellulosics like rayon, modal, and lyocell, are working together to bring improved aesthetic performance to stretch fabrics. By combining INVISTA's patented LYCRA® dualFX® fabric technology with LENZING's TENCEL® fibre, the two companies are delivering a unique solution to the industry: cellulosic denim fabrics with significantly improved shape retention.

According to Federica Albiero, INVISTA's Denim Account Manager for Southern Europe, about a year ago INVISTA began hearing about the challenges its mill customers were facing in developing stretch cellulosic fabrics. The company initiated a study to identify the underlying mechanisms of these issues and determine how to improve them.

"Given the growing popularity of both LYCRA® fibre and TENCEL® fibre in the denim market, it was only natural that people wanted to combine them to come up with really amazing fabrics", Albiero said. "However, as mills began experimenting they encountered issues such as growth, fabrics not keeping their shape, and fabric puckering due to seam slippage."

To address these issues INVISTA looked to its LYCRA® dualFX® fabric technology, which combines two stretch fibres - LYCRA® fibre and LYCRA® T400® fibre - into a single yarn. INVISTA ran trials pairing this technology with blends of cotton and TENCEL® fibre. The trials showed significant improvement in fabric recovery and slippage to the point where the fabric performance met or exceeded INVISTA's and the industry's standards. From there, INVISTA and Lenzing decided to work together to promote these fabrics in the marketplace.

Lenzing is pleased to work with INVISTA to help our customers develop commercial fabrics with strong marketing attributes. Both companies have global sales, marketing and technical teams supporting the developments and they will provide joint promotional materials as well as supply chain support and marketing information.

"This initiative represents two globally innovative fibre companies working together to provide the denim market with fabrics that meet the performance needs of modern consumers", says Michael Kininmonth, Senior Project Manager of Denim at Lenzing Fibres Inc. "Superior comfort with stretch and long-lasting recovery are set to become the next core product in women's wear."

"LYCRA® dualFX® fabrics bring a whole new standard of performance to denim so it was only natural to extend that technology to blends with TENCEL® fibre", said Albiero. "We are excited to work together with Lenzing and we think both companies can bring significant value to the marketplace." Recently, TENCEL® fibre has been reinvented by denim designers as the perfect complement to today's fashion trends. Jeans with TENCEL® fibre are attractive, durable, and become immediate favourites thanks to their enhanced comfort. The fibre's smooth surface and optimal moisture transfer benefits turn jeans into articles of clothing that enhance physical well-being while still being on-trend.

The revival of TENCEL® fibre in denim is also due in part to the environmental factor. Blending TENCEL® into denim fabric results in a significant improvement for the environment because it is made from wood grown in sustainably managed forests. The production process for TENCEL® fibre is based on a closed loop solvent spinning process and represents the greatest environmental achievement in cellulose fibre technology.

INVISTA introduced its LYCRA® dualFX® fabric technology to the market about two years ago. Initial applications were with cotton, where it brought improved shape retention to denim fabrics, especially to super stretch styles that were difficult to control using standard corespun yarns. Now those same benefits are being realized in fabrics with TENCEL®, offering a whole new range of development possibilities for the industry.

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Jeanologia in cooperation with Denim by PV will present the latest trends and inspiration of denim for the next season

The Spanish company Jeanologia, in collaboration with Denim by PV Paris and main weavers will presented on 27 and 28 November in the **"Jeans Gallery"** space of the exhibition, the latest denim trends and inspirations for next season.

Jeanologia, which **was recently awarded with the WGSN Global Fashion Award for best sustainable design team in the world**, has developed for the last 20 years sustainable technologies for garment finishing such as the textile laser, nano bubbles or ozone, which save water, energy and chemicals while reducing costs in the finishing process of the garments.

During the event, Jeanologia exhibited trends for next season based on three concepts: "The Folk West", "Get Rhythm" and "Pixelized" showing through different fabrics of the most important weavers in the world, how these pieces have been made.

In particular, the trend **"The Folk West"** inspired by an authentic vintage Jean focuses on combining the bohemian, hippie and ethnic purely vintage style. Laser designs as the key to achieve a vintage look.

In addition, **"Get Rhythm"** is a contemporary style with laser designs and retro old school tattoos textures. This trend is inspired by different musical styles, from Harlem musicians of the 40's, 50's jazz, to Motow & girl-groups of the 60s.

Furthermore, **"Pixelized"** is a trend with laser designs based on a digital aesthetic.

Enrique Silla, President Jeanologia stressed the value of this collaboration with Denim By PV Paris "already performed in previous years" and said that this exhibition "is not only a tour through the latest trends, but visitors can also know how garments are made.

In this sense, Silla stressed the importance of sustainability and transparency in the production process stating that "what matters now is not just the garment itself, but how it was done; the way we manufacture our products is a part of its DNA".

Also, during the event Jeanologia will show **E-Mark software** developed by the company, which integrates production and design while saving time in pre-production.

It is a web-based platform that integrates a new "Plug & Design" that improves results and makes easier laser design creation process by adjusting the tools and interface. In addition, this software has been developed not only to work with the machine, but also to be used as laser design software.

Jeanologia, 20 years changing textile industry

Jeanologia is formed by a multidisciplinary and highly

specialized team in design and art laser technology and ozone, textile engineering, as well as experts in the process of washing jeans.

After twenty years as leaders in the development of textile technology, currently the company is consolidated as a world reference in sustainable garment finishing trough textile laser, and ozone-based technologies and nano-bubbles.

In this regard, the company highly committed to respect the environment, has developed sustainable and efficient technologies for the garment finishing industry.. In the words of Enrique Silla: "Without respect towards our planet and the people who work in the textile industry there is no future in the world of fashion."

JEANOLOGIA has developed **textile laser that** reproduces vintage and usage effects on garments avoiding use of harmful techniques for workers and allowing energy, water and chemicals saving.

Highly aware of the negative impact that Denim industry has had during its beginnings, Jeanologia has developed other ozone-based techniques, such as **eco-washer G2** using ozone and oxygen from the atmosphere, allowing washing clothes with savings of more than 60% in water and energy and about 80% in chemicals.

It has also developed the nano-technology with the E-soft that softens clothes with nano bubbles, saving an 80% of **energy and softener** and 98% of water. Additionally, this technology uses no chemicals and avoids completely the discharges to the environment

Nowadays the Spanish company has customers across 5 continents. Jeanologia products and solutions are currently being used in more than 45 countries including.

Specifically, major brands such as Levi's, Polo Jeans, Abercrombie & Fitch, Edwin Japan, Pepe Jeans, Diesel, Hilfiger Denim, H&M , Salsa jeans, and other large retailers such as GAP, Uniqlo, Zara, have placed their trust in this leading Spanish company and the techniques and technologies developed by it.

Large Textile Machinery Companies have confirmed Participation in ITMACH 2014

Big names of global and Indian textile machinery manufacturers have confirmed their participation in ITMACH 2014. The event to be held in the textile city of Bhiwandi on the outskirts of Mumbai from January 22-24, 2014, is getting warm response from exhibitors and visitors. Bhiwandi, in spite of being a major textile manufacturing hub, has never hosted any textile machinery exhibition in the past. Thus, ITMACH 2014 being the first of its kind event in the city, has generated high expectations from the visitors, who are looking forward to witness a vibrant textile machinery exhibition.

In the meantime, all of the eight local textile manufacturers' associations, representing the whole industry, have extended their support and active participation in ITMACH 2014. So far, over 60 leading exhibitors have confirmed their bookings in ITMACH 2014 including industry bigwigs like Picanol, Tsudakoma, Staubli, A.T.E., Luwa, Kuesters Calico, Dornier, Aesa, Wan Li, Tai Sang Embro, Texworld, Yamuna, Best Air, Stovec, MS Orange and many more.

Having the participation of the market leaders in ITMACH 2014 affirms its importance for the growing western Indian market. "Picanol, in spite of being the market leader in the shuttleless weaving machinery market in India, we have keen interest in the market around this region. We see good potential for growth in both organized and unorganized weaving sector and continue to be close to our existing and potential customers. ITMACH 2014 will bring the opportunity to interact with large section of our customers based in western India" said ChetanLondhe, VP-Sales, Picanol India.

ITMACH 2014 is expected to draw over 15,000 visitors from across the textile clusters in western India. The promotion of the show in different textile hubs is on and industry professionals and decision makers from Kalyan - Dombivli, Ambarnath-Badlapur - Murbad, Mumbai & Navi Mumbai, Umbergaon & Tarapur, Vapi-Silvassa-Daman, Ichalkaranji, Solapur, Islampur, Kolhapur, Belgaum, Malegaon, Burhanpur, Surat & Ahmedabad, etc are expected in the show.

KNITSHOW - 2013 at A.T.E.

A.T.E. Enterprise Pvt. Ltd. organised **'KNITSHOW' - 2013'**, an unique exhibition-cum-seminar, at its office at Andheri, Mumbai (India) on 27th & 28th November, 2013. The show was formally inaugurated by Mr. Kenichi Motomaru, Director, Juki India Pvt. Ltd.

An array of Juki automated industrial sewing machines for chain stitch operation used for knit garments like t-shirts, polo shirts, undergarments and lingerie were on display at the exhibition.

Mr. Kenichi Motomaru, Director, Juki India Pvt. Ltd. inaugurating the exhibition

The machines displayed at the exhibition were: Cylinderbed Flatlock with Puller; Flatbed Flatlock; 4-Thread Over-lock with metering device; 4-Needle Flatseamer; Zigzag Stitch Machine; Single Needle Direct Drive Lock-Stitch with Auto Trimmer; Cylinderbed Flatlock with Fabric Trimmer and Auto Trimmer for Bottom Hemming; Cylinderbed Flatlock with Metering Device for Tape Attaching and Tape Cutter; Electronic Bartack to join Elastic Ends, etc.

Apart from the live demo of these Juki machines, seminars on **'Concept of Improving Productivity in Sewing Industry and Attachments and Devices for Knits / Lingerie Industry'** were held in 2 sessions on each day.

Representative of Juki demonstrating to the visitors

The show received an excellent response with as many as 54 visitors from 24 different companies turning up for the event, which included owners of various leading lingerie brands such as Salient, Valentine, Lady Care, VIP, etc. The visitors applauded this unique initiative and suggested to organise such events more frequently as they help in keeping abreast with the technical advancements at Juki, an innovative company with a continuous stream of new developments.

Many media houses such as Apparel Online, Fashion Era, Textile Value Chain and IPF Online also visited the show and took interviews of the visitors.

THE TEXTILE ASSOCIATION (INDIA)-BOARD of TRUSTEES

During the 74th Annual General Body Meeting held on 26th September. 2013 at Century Bhavan Auditorium, Dr. Annie Besant Road, Worli, Mumbai, following five Trustee Members are appointed to continue further as Members of Board of Trustees for the next Four years period of 2013-2016 unanimously.

Shri M.K. Mehra

Shri B.A. Shah

Shri R.K. Dalmia

Shri R.C. Kesar

Dr. P.R. Roy

Mr. Subhash Bhargava receiving the SDC membershipCertificate from Mr. Richard Straughan, President, SDC

Mr. Subhash Bhargava, MD, Colorant Limited is a Technocrat since 1980. He has worked at ATUL, Metrochem, Pidilite in various senior capacities. In the 90's he started his own manufacturing of reactive dyes. Within a span of 10 years he is already supplying to more than 650 customers in India and exporting to more than 15 countries. COLRON reactive dyes are well accepted in the market by the mill owners and Dyeing technicians. Last year COLORANT tied up with COLOROOT (the world's biggest Fluorine based reactive dyes manufacturer based in China) for marketing of Specialized Reactive Dyes in India.

Mr. Subhash Bhargava, MD, Colorant Ltd. Receiving the SDC certificate by hands of Mr, Richard Straughan, President, SDC

On 25 th November, 2013, SDC (Society of Dyers and Colourists) team consisting of Mr. Richard Straughan, President, SDC, Dr. Graham Clayton, Chief Executive, SDC, Mr. Andrew Filarowski, Dy. Chief Executive, SDC, Dr. Sanjiv Kamat (Past Global President, SDC) from UK came to Ahmedabad to deliver the certificate to Mr. Bhargava for his contribution to Dyestuff and Textile Industry at a function held at Hotel Fortune Landmark, Ahmedabad.

The SDC team from UK consisting of Mr. Richard Straughan, President, SDC, Dr. Graham Clayton, Chief Executive, SDC, Mr. Andrew Filarowski, Dy. Chief Executive, SDC, Dr. Sanjiv Kamat (Past Global President, SDC) in discussion with the COLORANT technical and Management team regarding the Applicability, Benefits and importance of COLOUR INDEX. The meeting was held on 25 th November, 2013 at Hotel Fortune Landmark, Ahmedabad. The meeting was followed by lunch.

A view of interaction Meeting

SDC, UK Officers with COLORANT Team

The COLORANT team participated whole heartedly to make the SDC meeting a grand success.

RIETER

Norbert Klapper takes over as CEO of the Rieter Group and also heads up the Business Group Spun Yarn Systems

Per January 1, 2014 Norbert Klapper will take over as Chief Executive Officer. As of the same date he will also head the Business Group Spun Yarn Systems. The current head of the Business Group, Peter Gnägi, is standing down per year-end at own request and hence from the Rieter Executive Committee. On behalf of Norbert Klapper he will provide support during 2014 in connection with strategically important projects. After four years with a dual mandate, Erwin Stoller will concentrate on the Board chairmanship.

As announced earlier on this year, Norbert Klapper takes over on January 1, 2014 as CEO of the Rieter-Group. At the same time Erwin Stoller relinquishes his dual position as Executive Chairman since 2009 but remains Chairman of the Board.

After graduating in mechanical engineering and receiving his Ph.D. in economics, Norbert Klapper accumulated widely based international experience in the machinery and plant engineering industry, particularly in the markets important to Rieter. His previous position was Executive Vice President Voith Turbo, Heidenheim, Germany.

Peter Gnägi, graduated in mechanical engineering at the Swiss Federal Institute of Technology in Zurich, joined Rieter in 1990. He was appointed to the Executive Committee in 2002, and has been in his current position since 2011.

The Board of Directors heartily thanks Peter Gnägi for his outstanding contribution to the further development of Rieter's textile machinery and component business. The Board of Directors looks forward to working with Norbert Klapper, and wishes him every success and satisfaction in his new position.

RIETER

Texworld Paris - Com4® was the Talking Point

From 16 to 19 September 2013, Texworld - one of the most important international trade fairs for the apparel and textile industry in Europe - was held in Paris. Again this year, Rieter was present with its Com4® exhibition stand and presented a wide range of information and products relating to the Com4® yarns. The response of the visitors to the stand was extremely gratifying and enabled Rieter to draw a positive conclusion of the exhibition.

On the Rieter stand, various fabric samples made from the Rieter yarns Com4®ring (ring yarn), Com4®compact (compact yarn), Com4®rotor (rotor yarn) and Com4®jet (air-jet spun yarn) could be viewed. Special here was the background information that was conveyed to visitors. Rieter as supplier of all 4 end spinning systems possesses in-depth expertise ranging from yarn production up to the end product and makes this knowledge available also at trade fairs such as Texworld. The main properties of the yarns, their advantages in downstream processing as well as the typical characteristics for the relevant fabric were explained and illustrated. In this way, the optimal yarn can be specifically selected for each required application.

Lively Demand for Com4® Documentation

In great demand was the Com4® license directory with the Rieter Com4® licensees and reference customers which was supplied on the stand. Yarn handlers and purchasers valued the contact data and the related information on the product range. Especially important for them was the certainty that the yarn produced is of good quality. For Rieter, the interest among existing Rieter customers in also becoming Com4® licensees was particularly gratifying.

The Rieter Com4® Yarn Seminar

Equal interest was also aroused by the Com4® yarn seminar for yarn handlers, weavers and knitters that Rieter launched in 2012. This has been shown by the four seminars already held in Switzerland, China and India in addition to the first applications for the courses in 2014 that could be taken at the Texworld.

RIETER

RIETER COM4® Yarn Seminar In India

11/22/2013 - The first Rieter Com4® yarn seminar in India was held on September 20, 2013, at the TWIC-IKFA Convention Centre in Tirupur, India. The event took place in parallel with SS Textile Media Pvt. Ltd's Yarnex and TexIndia 2013 exhibitions at the India Knit Fair Complex. The Rieter Com4® yarn seminar is a part of Com4® yarn's global promotional activities.

Rieter Com4@Yarn Seminar in India: Great interest of participants

The seminar targeted yarn traders, buyers from the weaving, knitting and garment manufacturing industries, and sellers in India. With a presentation of the 4 Com4® yarns with a strong focus on the requirements of yarn buyers and sellers, the seminar provided extensive information on the different behaviors of the yarns, typical areas of application and potential end products.

The objective of the seminar was to explain the differences between the 4 spinning technologies, with a focus on current practice:

- technological information about the 4 spinning systems: ring spinning, compact spinning, rotor spinning and air-jet spinning
- Information on typical characteristics of Com4® yarns: behavior in further processing, advantages of fabrics made with Com4® yarns, and typical end products

A great success

More than 50 people participated in the one-day program, which started with a welcome address and introduction to Rieter. Further topics were discussed in detail, such as spinning technologies, behavior in downstream processing, typical fabric appearance, potential end applications, and the evaluation of yarn characteristics.

Positive feedback

After the presentations, participants had the opportunity to compare all 4 Com4® yarns, fabrics and end products, and received comprehensive documentation, including fabric samples and certificate of participation. Their positive feedback on the event gave us a good insight into what participants expected from the seminar and how we could develop it further in future

The seminar offered participants a unique chance to understand the differences between the 4 spinning technologies. We think this in-depth knowledge will facilitate communication with contract partners in the yarn industry and open up new opportunities.

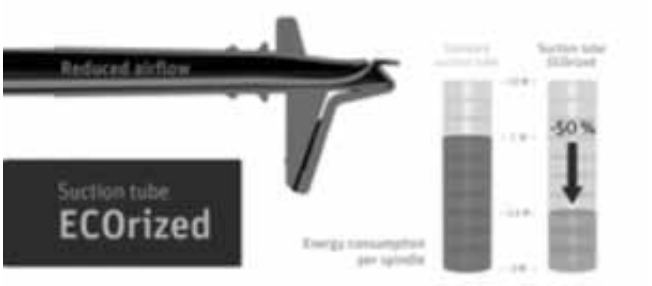
ABOUT RIETER

Rieter is a leading supplier on the world market for textile machinery and components used in short staple fiber spinning. Based in Winterthur (Switzerland), the company develops and manufactures systems, machinery and technology components used to convert natural and manmade fibers and their blends into yarns. Rieter is the only supplier worldwide to cover spinning preparation processes as well as all four final spinning processes currently established on the market. With 18 manufacturing locations in 10 countries, the company employs a global workforce of some 4 700, about 27 % of whom are based in Switzerland. Rieter is listed, on the SIX Swiss Exchange, under ticker symbol RIEN. (www.rieter.com).

Suction Tube Ecorized-Customer Reduces Energy Costs by 66'600 US Dollars

The theoretically calculated energy-saving potential resulting from use of the Rieter suction tube ECOrized on ring spinning machines proves itself in practice. The Rieter customer Baris in Turkey had 14 ring spinning machines equipped with the innovative suction tube and thus saves around 66'600 US Dollars in energy costs per year. The commentary of the customer can be seen as a video on the Rieter website.

Proof in practice - Baris, the Rieter customer demonstrates how it can make an annual saving of around 66'600 US Dollars annually; thanks to the Suction tube ECOrized



The suction tube ECOrized reduces the suction power with ring spinning machines by up to 50 percent. A sustainable lowering of energy costs is the benefit that results.

Texttreasure

"One of the most important keys to Success is having the discipline to do what you know you should do, even when you dont feel like doing it."

- Unknown

A substantial proportion of the costs with yarn production is generated by the energy consumption. Efficient use of energy therefore saves costs and is environmentally-friendly. With the suction tube ECOrized for the ring spinning machines G 32, G 33 G 35 and G 36, the suction power can be reduced by up to 50 percent. An effect that sustainably lowers energy costs in the spinning mill.

Practice-proven

The possible energy saving calculated in theory with the use of the suction tube ECOrized has been proven in practice. Baris, a Turkish Rieter customer spinning yarns for its own spinning mill, saves up to 10 percent energy resp. 66 600 US Dollars annually with its 14 converted ring spinning machines.

The commentary of the Baris Mill Manager

The commentary from Baris published on the Rieter ECOrized-website (www.rieter.com/ecorized) verified the energy-saving potential. Mr. Mahmut Kilinç, Mill Manager at Baris, provides the figures showing how the use of the Suction tube ECOrized has proved worthwhile for the company. The video interview with Mr. Mahmut Kilinç is available under www.rieter.com/ecorized#c23741.

ECOrized

Energy efficiency and energy savings are today of increasingly paramount importance. This subject has been taken into consideration for many years by Rieter and led to the development of new, innovative products to lower electricity costs and to reduce environmental stress.

"TechTex Asia 2014" - The First Ever Online Trade Fair for Nonwovens & Technical Textiles to be Organized by DCI

Diagonal Consulting (India), a Management Consulting firm specializing in the field of Fibres, Textiles & Nonwovens is proposing to organize **TechTex Asia 2014**, the first ever 365 Days Online Trade Fair for the Nonwovens & Technical Textiles Industry, starting from January 2014.

Online trade fairs can be best explained as a multidimensional platform, where a company can exhibit its products and services to the international audience, get a global exposure and discerning buyers from all across the globe. Grasping every essence of a traditional fair, these Online Trade Fairs are gaining momentum and are becoming major elements in branding and marketing for companies in non traditional domain. The visitors to an online event get a real time experience of visiting a ground event; they can view presentations & brochures, visit the exhibit booths, communicate with the companies, exchange cards and enhance their business opportunities.

The key highlight of TechTex Asia 2014 is its promotion across major **"User Industry" & "Events"** in the field of Agriculture, Automotive, Industrial, Medical & Hygiene, Building & Construction, Packaging, Protective Clothing's, Sports, Textile Composites, Nonwovens & Industrial Fabrics. Moreover the Unique **"Select Geographic Lead Generation Model"** enables exhibitors to focus on select countries for lead generation. The event is to be promoted across 20,000 companies from the user industry & institutions in Asia. Brands can have distinct visibility directly to its user industry in Asia.

To know more about the event, kindly visit www.diagonal.in

Contrasting 'on ground' events where exhibitors are given a day or two to market their products, Online trade fairs give them the opportunity to showcase their products and services throughout the year leading to a better & focused business opportunity.

For your kind interest in "TechTex Asia 2014" requested to kindly lock your participation for a promising opportunity to be amongst your user industry in Asia.

For more details, contact,
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nirav.dci@diagonal.in

Texfair 2013, Coimbatore

December 13-16, 2013

Bräcker, Graf, Novibra and Suessen - Experience the difference

The 4 companies Bräcker, Graf, Novibra and Suessen joined their sales forces, uniting the world's leading brands for the supply of technology components to the textile industry, forming the only global provider of components for all spinning technologies. At Texfair the latest development to improve fibre yield and productivity presented.

Bräcker AG
At the Texfair 2013, Bräcker will exhibit their well known, high quality key components for ring spinning machines:

RAPID traveller inserting tool and Bräcker AP system
Bräcker RAPID inserting tools allow spinning mills to change travellers very quickly and efficiently with reduced labour involvement to a minimum. Magazining system for C-shaped travellers. RAPID offers a capacity of 4 rods (130 to 400 travellers according to size). All rods are identified with traveller type and number.

Bräcker Ring / Traveller systems - with best value for money
Our continuous efforts in developing new travellers, in response to new requirements, allow us to constantly introduce new travellers to optimize productivity and efficiency of the most modern ringspinning machines.

30 Million TITAN Spinning Rings

Bräcker has been able to maintain its leadership position in spinning rings with their TITAN ring, of which so far more than 30 Mio pieces have been sold to successful spinning mills around the world.

Bräcker will also exhibit the proven accessories such as:

- **TITAN** and **ORBIT** spinning rings
- **PYRIT** and **ZIRKON** travellers for especially demanding applications
- The well-known and appreciated range of **BERKOL Cots** and **Aprons**

Bräcker RAPID inserting tools allow spinning mills to change travellers very quickly and efficiently with labour involvement reduced to a minimum.

Graf + Cie AG

As a renowned partner supplying premium components for key processes in the short staple spinning industry and nonwoven application, Graf is the leading manufacturer of metallic card clothing, stationary flats and flexible flat clothing, circular - and top combs for most major producers of carding and combing machines as well as spinning mills. Graf provides added value to customers spotlighting convenience at work, superior performance and focusing on high quality yarn output.

The innovative 'Camel'-type metallic card clothing defines a new benchmark

The innovative tooth shape of the ‚Camel'-type metallic card clothing has a positive effect on the airflow, allowing for the fibres to be kept ideally on the surface of the cylinder wire. This improved positioning on the surface results in an easy transfer of the carded material to the doffer and a marked reduction in the return flow of fibres. The lower rate of fibre damage leads to a substantial decrease in the waste generated in the combing process which is equivalent to an increase in the share of good fibres. The higher rate of elimination of ‚white spots', i.e. dead and immature fibres, is a further advantage of the special tooth geometry, optimizing the fibre guidance and improving the elimination of dead fibres.

Resist-O-top flexible flat clothing

The resist-O-top generation of flexible flat clothings for processing of cotton, man-made -, and regenerated fibres as well as for blends and swing applications is another of Graf's innovations with a noticeable impact in the market. The resist-O-top setting pattern favours the extraction of short fibres and trash as well as the elimination of neps. This flat series is progressively set without straight gaps between the rows of teeth. The wire dimensions for all C and M-types are selected with a difference of 5 numbers. The whole range of flats is available for all different types of cards.

Resist-O-top flexible flat clothing

Circular Comb PRIMACOMB 9015

The Circular Comb PRIMACOMB 9015 was developed by Graf in close co-operation with Rieter. In this context, with its five segments, this product provides optimum results in the combing of medium and long staple cotton for very high yarn counts. The five sections in alternately slanted arrangement lead to a noticeable improvement of the IPI values. Close manufacturing tolerances and first class raw materials assure even quality parameters throughout the entire lifetime.

Ri-Q-Comb for Rieter E80 comber

The latest series of circular combs is exclusively designed for the new combing machine of Rieter type E80. The comb with a design that takes into account latest technological developments and requirements has a much enlarged combing area in excess of 130° and will be available in three versions. The range of the new combs is as follows: Ri-Q-Comb i400 for short and medium staple, Ri-Q-Comb i500 for medium and

long staple and Ri-Q-Comb i700 for very long staple. The obvious benefit of the new series of combs to the customer is the marked improvement in quality and production!

Novibra Boskovice s.r.o.

Novibra is the leader in spindle technology and the only 100% in-house spindle maker. A wide range of spindles has been developed to meet all requirements of yarn producers and spinning machine manufacturers worldwide. The high performance of spindles on modern automated ring frames requires state of the art clamping device for an effective and reliable doffing. New Novibra clamping crown CROCOdoff ensures improved cutting (no yarn underwindings) and leads to reduction of yarn breakage during start up. Others benefits are reduction of material loss, reduction of energy consumption and reduction of maintainance costs (less cleaning).Improved "CROCO teeth" design further evolve well proven solution of clamping of yarn. CROCOdoff has been designed for use on new machines as well as for old machines upgrade. In field testing is going successfully on with various manufacturers of branded ring frames.

CROCOdoff

Spindelfabrik Suessen GmbH

Since its foundation in 1920, the SUESSEN company has been of great value for the spinning industry by an immeasurable amount of innovations and developments with lasting effect and influence on the history of spinning.

SUESSEN is the acknowledged Leader in Open-End Rotor Spinning and Compact Ring Spinning Technology.

The well-known Open-End SpinBoxes SE 7, SE 8, SE 9 and SE 10 were developed and manufactured by SUESSEN. The latest SpinBox generations, SC and SQ series, are delivered to the manufacturers of rotor spinning machines Rieter in Switzerland and Savio in Italy, but also retrofitted into existing rotor spinning equipment. In total, SUESSEN has manufactured over 3,000,000 SpinBoxes.

SUESSEN's EliTe®Compact Spinning System has been sold for over 6,500,000 spindles and has established itself as the most versatile compact ring spinning system. Existing ring spinning machines of various manufacturers can be upgraded to compact spinning, using SUESSEN EliTe®CompactSet.

ELiTe® Compact Spinning system

At SUESSEN, we feel that we are truly able to differentiate our products from those of the competition. In the upcoming Texfair 2013, we want to demonstrate:

- Our Technology Leadership in spinning
- The many benefits we provide for our customers in terms of improved technology and productivity
- Impressive return on investments achieved by the acquisition of modernization packages. We make considerable investments in continuous R&D, combined with applied research that is directly carried out at our customers' mills. This ensures that we are able to further develop our technical and technological components in both an uncompromising and resolute manner. In particular, we focus on universal applicability, improved yarn quality, increased service life, reduced maintenance and proven reliability in industrial application.

Texfair Show Highlights

- **EliTe®CompactSet V5**
- HP-GX 3010 Top Weighting Arm for short-staple ring spinning machines

- HP-GX 4010 Top Weighting arm for roving machines
- **ACP Quality Package** with new **PINSpacer NT**
- **EliVAC-CDS** (Central Duct System)
- **Premium Parts** - Spinning Components and Spare Parts for Autocoro rotor spinning Machines

EliVAC-CDS - Central Duct System
EliVAC is the unit to create the negative pressure for our EliTe®Compact Spinning System. The central ducts are located on top of the creel of the ring spinning machine. The EliBox generates the negative pressure with a fan driven by one motor. The main advantages are:

- Easy and fast installation
- No rotating drive shafts, pulleys, belts, bearings…
- No individual fans for groups of EliTubes
- Less energy consumption by approx. 20%
- Less maintenance required
- Fewer spare parts required
- Easy system operation

Worldwide we have sold over 6,500,000 units of EliTe®Compact Spindles.

ACP Quality Package with new PINSpacer NT
The Active Cradle with the PINSpacer NT improves the drafting process by an enhanced interfibre friction in the main draft zone. The Active Cradle with flexible leading edge and optimised pin position

- improves the values of the most important yarn parameters and
- is suitable for all popular top weighting arms

Premium Parts - Spinning Components and Spare Parts for Autocoro Rotor Spinning Machines. We show the new type of

- SOLIDRING S43 3.6 for special applications and the
- SpinBox SE 9 Performance Kit

The SUESSEN Product Range
1. Ring Spinning
1.1 SUESSEN EliTe®Compact Spinning System

- EliTe®CompactSet-S for existing ring spinning machines in short-staple spinning
- EliTe®CompactSet-L for existing ring spinning machines in worsted spinning
- Optional applications: EliTwist®, EliCoreTwist®, EliVAC-CDS, ACP

1.2 SUESSEN HP Drafting Systems for ring spinning and roving frames
Customers buying new ring spinning machines and/or roving machines may specify our components directly with the machine maker.

- HP-GX 3010 Top Weighting Arm for short-staple ring spinning machines
- ACP-Quality Package - Active Cradle interacting with PINSpacer
  - better fibre guidance for better yarn quality
  - ACP solutions available for top weighting arm models HP-GX, HP-A, PK type and P3.1
- HP-GX 4010 Top Weighting Arm for roving frames - the top weighting arm that most of the Chinese OEMs select for their roving frames
- HP-GX 5010 Top Weighting Arm for worsted spinning machines
- HP Components as HP Bottom Rollers with bearings, HP-R Top Rollers, cradles, cradle spacers and aprons etc.

2. Open-End Rotor Spinning
2.1 SpinBoxes for OEMs
SC-R for RIETER, SC-S for SAVIO

2.2 Premium Parts - Modernization of SE 8 and SE 9 Autocoro Rotor Spinning Machines
- with SpinBoxes SQ 1-M/ SQ 2-M

2.3 Premium Parts - Modernization Packages for Autocoro Rotor Spinning Machines

- ProFiL®Cartridge "energy saving" EverClean axial rotor bearing for SE 7 to SE 10
- SweepCat trash removal system
- Piecing-Up Package
- Package Cradle Shock Absorber
- Carbon Fibre Rod

2.4 Premium Parts Spinning Components and Spare Parts for SC-M, SQ-M, SE 7 - SE 11

- **ProFiL**®Rotor
- **ProFiL**®Cartridge - EverClean axial rotor bearing
- **ProFiL**®Reflector
- TwinDisc with 2 Cooling Grooves
- SOLIDRING/ Opening Roller
- **ProFiL**®Navels
- Channel Plate/ Channel Insert
- Torque-Stop
- **ProFiL**®BrakePad
- All SpinBox related spare parts

VDMA: German Technology successfully met Indian Textiles

The two VDMA Textile Machinery Conferences held on 16th December, 2013 at Mumbai, India Mumbai and Coimbatore has received excellent feedback from Indian textile mills. 16 textile machinery builders from Germany, their agents and subsidiaries presented their latest technologies to more than 270 decision makers and technical management of Indian textile manufacturers.

In Mumbai, the conference was addressed by the honorary guests Mr. A.B. Joshi, Textile Commissioner, Ministry of Textiles (Government of India) and Mr. Michael Siebert, Consul General of the Federal Republic of Germany. Mr Joshi appreciated that German textile machinery builders are leaders in innovation and mentioned that the conference will deepen the longstanding contacts and cooperation between the German and Indian companies.

Who's who of India's Textile industry

Mr. N. Jaganathan, Manager KG Denim Ltd., a renowned denim and home textile producer stated: "It was really a well organised conference and a strong technological counter at Coimbatore. Our minds are now sharpened with ambitions to improve the technologies in processing and machinery. We cheer the VDMA efforts for converting this conference very successfully."

Other famous Indian textile manufacturers that attended the VDMA conferences have been companies such as Arvind Mills, Birla Textile Mills, Bombay Rayon Fashions, Century Enka, Kusumgar, Mafatlal Industries, Nakoda, Welspun India, Reliance Industries, Rajasthan International, Raymonds, SRF and VTX Industries.

Energy and material efficiency keep costs down

The focus of the conferences was on technology for fabric production. The technology lectures of the German machinery builders were hold in two parallel sessions "production, finishing and dyeing of knitted fabrics" and "production and finishing of woven fabrics".

In their presentations, the experts and engineers from Germany convincingly demonstrated that German technology is ahead when it comes to higher productivity, product quality, reliability as well as new or upgraded products such as technical textiles. High attention was paid to the issue of energy and material efficiency since it is a key to succeed in keeping costs down and so to increase profitability.

Life Cycle Costs was an important topic also during the lively panel discussions after the lectures. To put it in a nutshell: The initial price for a German machine pays off after a few years due to low maintenance costs and reliability in production. The reason behind this is that the investment costs represent only about 10-50 percent of the overall costs that occur during the entire lifetime of a machine. There are costs which are often not transparent at first glance and prove the German proverb "Buy cheap, buy twice".

Participated German Companies and Institutions:

A. Monforts Textilmaschinen, Allma Volkmann Zweigniederlassung der Saurer Germany, Brückner Textile Technologies, Erbatech, Groz-Beckert, Heusch, Hohenstein Textile Testing Institute/OEKO-TEX®, Karl Mayer Textilmaschinenfabrik, Körting Hannover, Landesbank Baden-Württemberg, Lindauer Dornier, Mahlo, Mayer & Cie., Merz Maschinenfabrik, Setex Schermuly Textile Computer, Thies, Welker Spintech, Wumag Texroll.

More information on the VDMA events in Coimbatore and Mumbai can be found on www.germantechnology-indiantextile.de

Round-table Discussion on 'Zero Liquid Discharge in Textile Industry - Is it a viable option?'

The Textile Association (India), Delhi Unit organized, in collaboration with ETI Dynamics and IIT Kanpur (IITK), around table discussion on 'Zero Liquid Discharge in Textile Industry-Is it a viable option? 'The event held on 8th November 2013, in New Delhi, focused on finding various feasible technological and financial solutions available for implementing ZLD mechanism in the textile industry.

The discussions were led by Prof. Vinod Tare, IIT Kanpur (also the project co-coordinator for Ganga River Environment Basin Management Plan being prepared by a consortium of 7 IITs on behalf of Government of India) and Mr. Sanmit Ahuja, Chief Executive of ETI Dynamics. Mr. Navin Goyal, Chairman of TAI Delhi gave opening remarks for the round table.

View of Round Table Discussion

In his opening statement, Mr. Sanmit Ahuja talked about the major challenges being faced by the Indian textile industry with respect to water and waste water. He emphasized the need of the industry to find innovative techno-commercial solutions needed to improve the quality of water treatment as sets being developed. The key point he stressed on was the currently prevailing low CAPEX (Capital Expenditure) and OPEX (Operational Expenditure) of the assets which in the long runisa poor investment as these plants almost all ways fail to deliver the necessary effluent treatment standards.

Dr. Vinod Tare highlighted the significance of sustainable, environmental friendly development of the industry by internalizing the environmental management cost and creating a balance through utilization of water back in to the industry. He pointed out that effluent no thing but a combination of sugar and salts. The presence of sugar can be managed but it is the high salt (TDS) concentration that causes great pain. He recommended that the capacity of the rivers could be utilized as a salt transport mechanism during the monsoons. He emphasized that the industry required financial and economic model from a policy perspective to achieve the sustainable cum cost-effective treatment of effluent water. Further, he stated that a new market based and regulatory model needs to be developed that would deliver a sustainable growth model without contracting growth from the industry.

Mr. Navin Goyal and Mr. Vikas Bhargava from TAI (Delhi) pointed out that the industry is becoming increasingly aware of the environmental issues & understands the implication of a complete ZLD system in context of maximum industrial water reuse and reduced raw water consumption.

Ms. Shruti Mittal, a consultant to TAI indicated that it is imperative for the textile industry to follow preventive approach, though, water consumption in most units have been brought down but further reduction is required in order to meet global standards. She ascertained combined effluent, discharge of solids, availability of technology and its cost viability as the chief bottlenecks in the industrial water treatment. Implementation of economically viable combination of treatment technology and cluster based approach will bring together the industry in attaining the goal of ZLD.

Mr. K. K. Aggarwal of TAI mentioned that it is the responsibility of the municipal government to control the disposal of water in to rivers. He suggested that the Municipal Corporation should provide a water discharge connection, where the discharge of polluted water should be metered and accordingly, a taxable price paid.

Technology & Solution providers offered in puts on benefits of going for ZLD with the reliable figures of CAPEX and OPEX involved, which helped in resolving the uncertainties of industries. It was also stated that the low cost of raw water available was the reason why most companies were hesitant treating the waste water and in cura relatively higher cost. This is more applicable to Northern part of India which has more water than Western or Southern which is water stressed. Further they added that, if the long run envi-

ronmental and economic benefits obtained by the industry were considered, then the investment cost was not very high.

Towards the end, ETI Dynamics' CEO Sanmit Ahuja highlighted various financial models that could be exercised to find out a solution to the textile industry effluent problem. ETI Dynamics show cased a Design-Build-Operate (DBO), Design-Build-Finance-Operate-Transfer (DBFOT) model for the textile sector. Using this model, the firm would set up an effluent treatment plant at its expenditure using some of the best technological solutions in the world and will sign a 10-15 year agreement with the textile operator. The investment will be recovered through charging a tariff on per liter of effluent treated.

ETI Dynamics invited the textile industry and the technology companies to come forward to form an innovative techno-regulatory-commercial model for the paper-pulp effluent application. This model will be facilitated through ultra-cheap international loans available for environmental projects.

Mr. Sanmit Ahuja invited the textile industry to come forward and express their interest towards the implementation of a model project. This model project would be replicable across the entire textile industry. ETI Dynamics would take the primary responsibility of inance and invest in the plants.

The Round table attracted over 30 participants and stakeholders from the textile industry. Dignitaries from The Textile Association (India), Mr. Navin Goyal, Mr. R.L. Kapoor, Mr. K.K. Aggarwal as well as senior representatives from various companies such as Alps Industry, Amko Exports, Sutlej Textiles, Innovative Textiles, Vardhman, Polytex and Intertek, among others participated enthusiastically in the discussion.

The Lindauer DORNIER GmbH - innovative and sustainable

The Bavarian-Swabian machine engineering company, already renowned worldwide for its versatile rapier and air-jet weaving machines, specializes more and more in machine developments for woven products is meeting the highest functional standards.

Intensified development activities have not only been brought to market maturity for technical textiles for fiber composite materials. In addition to the leno weaving process (DORNIER EasyLeno®), the DORNIER Open Reed Technology (ORW) for "multiaxial" usage has been further developed. Integrating this technology in a wide variety of applications has opened up new options in surface structures while at the same time improving functionality, e.g. for lightweight construction, in the transport and construction industries or in general protection functions. Lindauer DORNIER GmbH invests approximately 8 % of its turnover annually in research and development that is the double compared to German mechanical engineering.

Closed or straight fabric structures are being supplemented more and more by new, grid-type multiaxial structures and 3D Jacquard fabrics. The high performance products created in this manner can only be manufactured when all levels of the production process synchronize with highest precision.

DORNIER convinces through its experience and competence in weaving technology. This combination together with the know-how of its partners also creates an added value for customers in the sectors coating, downstream processing and manufacturing of semi-finished products.

DORNIER's high-precision weaving machines therefore form an important link in a complex production process.

Processing "intelligent" yarns for function-optimized fabrics, but also for very heavy yarns, e.g. for conveyor belts, is also a DORNIER standard.

Comprehensive performance and solution offers provide the basis for stable production processes and new products. More efficient resource usage in the areas of materials and energy as well as air consumption are essential criteria in our developments.

Company Listing on www.textileassociationindia.org

HURRY-UP !!!
Early Bird Offer

The Textile Association (India) has planned to move a step ahead and enable advertising opportunities in **Company Listing** on TAI website www.textileassociationindia.org to interested advertisers.

Website has received huge visits from National and International textile companies. Thus keeping this is mind, now introduced a market place on our website http://www.textileassociationindia.org as Company Listing. For pricing as low as **INR 990** only per **annum**, Advertisers will get Perfect Target Audience, Free Webpage to upload your product, Information about your Products, Special **Company Listing** and much more.

Company listing is made very simple and easy to upload Company Product to boost the business and get online enquiry/order in the following **Product Categories**.

Product Category:

- Yarn Manufactures
- Machinery Manufactures
- Garment Manufactures
- Project Consultant
- Testing Equipment Manufactures
- Humidification Manufacturers
- Printing & Packaging
- Distributors
- Traders / Suppliers
- Fabric Manufactures
- Machinery Accessories Manufactures
- Auxiliary / Equipment Manufactures
- Exporter / Importer
- Dyes & Chemicals Manufactures
- Home & Furnishing Manufacturers
- Service Providers
- Retailer
- Others

More Details please Contact
The Textile Association (India)
Pathare House, Next to State Bank of India, 67, Ranade Road, Dadar (W), Mumbai - 400 028 India
Tel.: +91-22-24461145, Fax: +91-22-24474971
E-mail: taicnt@gmail.com, Website: www.textileassociationindia.org

INDIA

InFashion - 4th Edition - Design + Trends + Sourcing International Textile and Ingredient Innovation Show Concurrent Show: India Fashion Forum, India Shoes & Accessories Forum

Date : 16th, 17th & 18th January, 2014
Venue : Hall No. 5&6, Bombay Exhibition Centre, Goregaon (E), Mumbai, India
Contact : Mr. Adarsh Verma
M. : +91-9999251621
E-mail : adarshverma@imagesgroup.in

ITMACH - International Textile Machinery & Accessories Exhibition

Date : 20th to 24th January, 2014
Venue : Indian Corporation Premises, Mumbai-Nasik Highway (NH-3), Anjurdive, Bhiwandi,
Contact : Mr. Arvind Semlani -
M. : +91-9833977743
Mr. Farid K.S. -
M. : +91-9869185102
Tel. : +91-022-22017013/61
E-mail : info@itmach.com, services@itmach.com

4th International Inkjet Conference 2014
(will focus on the creative and commercial opportunities in digital textile printing)

Date : 22nd February, 2014
Venue : New Delhi
Contact : Inkjet Forum India Head Office : D/4, Karnatak Building, Mogul Lane, Matunga (W), Mumbai - 400 016 INDIA
*E-mai*l : aditya@inkjetforumindia.com

Techtextil - Russia

Date : 11th to 13th March, 2014
Venue : International Exhibition Centre
Expocentre Fair Ground, Moscow, Russia
E-mail : techtextil@messefrankfurt.ru

TECHNOTEX - 2014
3rd International Exhibition & Conference on Technical Textiles

Date : 20th to 24th March, 2014
Venue : Bombay Exhibition Centre, Goregaon (E), Mumbai, India
Contact : Mr. Manoj Mehta, Deputy Director
FICCI Trade Fair Secretariat, Federation House, Tansen Marg,
New Delhi - 110 001
Tel.: +91-11-23487581,
Fax : +91-11-23359734
M.: +91-9654258258
E-mail : manoj.mehta@ficci.com,
amit.kakkar@ficci.com,
technotexindia@gmail.com

The Textile Association (India) organizes in Association with Thailand Convention & Exhibition Bureau (TCEB) WORLD TEXTILE CONGRESS 2014

Theme : **"Global Textile - Opportunities & Challenges in an Integrated World"**
Date : 23rd to 25th May, 2014
Venue : Bangkok, Thailand
Contact : Mr. Arvind Sinha - Conference Chairman
The Textile Association (India) - Central Office
Pathare House, Next to State Bank of India, 67, Ranade Road, Dadar (W), Mumbai - 400 028 India
Tel. : +91-022-24461145, Fax: +91-022-24474971
M. : +91-9820062612
E-mail : taicnt@gmail.com, lionasinha@gmail.com

Every effort is made to ensure that the information given is correct. You are however, advised to re-check the dates with the organizers, for any change in schedule, venue etc., before finalizing your travel plans.

The views expressed in this journal are those of the authors. They are not necessarily the views of editor-publisher.

11TH INTERNATIONAL & 69TH ALL INDIA TEXTILE CONFERENCE

Hosted & organized by The Textile Association (India), South Gujarat Unit
20th & 21st December, 2013 at Hotel Gateway (TAJ), Surat

The Textile Association (India) is the foremost leading and largest national body among other several professionals of textile in India was established in the year 1939 and now it is poised to cross 75 years of service to the textile industry. The Textile Association (India) is celebrating its Platinum Jubilee this year. To commemorate the function, The Textile Association (India) - South Gujarat Unit has organized 11th International & 69th All India Textile Conference held on 20th & 21st December, 2013 at the Taj Gateway Hotel, Surat. The conference theme was **"Indian Textiles - Global Prospects and Perceptions"**. Top experts from Textile and Apparel sectors from all over the country gathered to share their valuable knowledge. Jam-packed audience of experts and delegates was there not only to listen to them, but also question them on scores of issues concerning the textile industry.

The Textile Association (India), Central and South Gujarat Unit, welcomed all the Dignitaries, Guests, Delegates, Press & media. Then the conference began with invocation of Sri Ganesh Vandana presented by the Student.

Nearly more than 600 delegates were gathered from every nook and corner of country, as well as some from across the world to participate in this 11th International & 69th All India Textile Conference that has been hosted and organized by TAI South Gujarat Unit. It was great to note such a mammoth turnout-and one is tempted to glance back into history.

TAI South Gujarat Unit was established in the year 1967 and having more than 800 members. This mega conference was organized in Surat, the city of Diamond and Man-Made Textiles in India after a long gap of 28 years, South Gujarat Unit has again geared up in hosting this conference after successfully organized 42nd All India Textile Conference in 1985 in which Shri Dhirubhai Ambani, Reliance Industries Ltd. was conferred with Hon. Membership of TAI.

At the inaugural session, the Chief Guest was Shri Hrishikesh Mafatlal, Chairman, Mafatlal Industries Ltd. Shri A.B. Joshi, Textile Commissioner, Ministry of Textiles, GoI and Shri Kamal Dayani, Industries Commissioner, Govt. of Gujarat, were the Guest of Honor, but both could not present due to their political assignments. As well as Shri Praful Shah, recipient of TAI Honorary Member-ship, Shri Rajanikant Bachkaniwala,Conference Chairman, Dr. P.A. Khatwani, Conference Secretary, Shri D.R. Mehta, National President, Dr. Anil Gupta, National Vice President, Shri Girishchandra Bhatt, President, TAI

Shri Hrishkesh Mafatlal, Chief Guest lighting the lamp along with other dignitaries

South Gujarat Unit, Shri K.D. Sanghvi, TAI Chairman, Shri V.D. Zope, TAI Hon. Gen. Secretary and Shri Virendra Jariwala, Hon. Secretary, South Gujarat Unit were present on the dais.

Mr. Girishchanda Bhatt, President, TAI South Gujarat Unit given his welcome address and then Mr. Rajanikant Bachkaniwala, Conference Chairman briefed about TAI and the Conference with it status.

Then Mr. D.R. Mehta, TAI National President, a dynamic personality, wide experienced and an enthusiastic man presented his Presidential Address.

He briefed about the TAI activities, current industry scenario, and global economy. He also touched to the Indian fast emerging market, global economic crisis. Also he expressed his personal opinion about conventional industry and consolidated efforts to take by various associations and Ministry.

Then the award presentation & felicitation was done to some eminent people to acclaim their outstanding contribution, service and achievements in the course of their profession. The awards of excellence were given to people who truly deserve by hands of Chief Guest Shri Hrishikesh Mafatlal.

The Textile Association (India) conferred Honorary Membership to Shri Praffulchandra Shah, Chairman, Garden Silk Mills Ltd. for his tremendous contribution to the Indian Textile Industry. He has made a place for Garden silk Mill not only nationally, but also globally. Shri Praffulchandra Shah could not present due to some most urgent official work, so on his behalf Mr. Ketan Jariwala received this prestigious award of TAI.

Mr. Ketan Jariwala receiving the Hon. Membership Award on behalf of Shri Praful Shah by hands of Shri Hrishikesh Mafatlal

The Textile Association (India) conferred Honorary F.T.A (Fellow the Textile Association) to Prof. G.K. Tyagi, Principal, Director at MLV Govt. Textile & Engineering College, Bhilwara, eminent scientist for his outstanding contribution made in the field of Textile Research & Development.

Prof. G.K. Tyagi receiving the F.T.A. Award by hands of Shri Hrishikesh Mafatlal

In order to recognize and appreciate the meritorious services and special outstanding contribution for the Textile Association (India) and its Unit, the TAI awarded Service Gold Medal to Shri K.J. Patel, Trustee member of TAI Ahmedabad Unit.

Shri K.J. Patel receiving the Service Gold Medal by hands of Shri Hrishikesh Mafatlal

The spirit of encouragement prevails at Unit Level Service Memento was awarded to inspire and motivate the members to contribute their selfless services at Unit level. The first award instituted by late Shri J.J. Randeri was awarded to Shri R.R. Mehta, TAI Mumbai Unit.

Shri R.R. Mehta receiving the Service Memento by hands of Shri Hrishikesh Mafatlal

The Second Service Memento award instituted by late Shri H.A. Shah was awarded to Shri A.D. Patel, Hon. Secretary, TAI, Ahmedabad Unit.

Shri A.D. Patel receiving the Service Memento by hands of Shri Hrishikesh Mafatlal

Best Unit trophies are floated with an idea to provide an incentive to the active Unit and to encourage others to be more and more active, contributing to the consolidation of The Textile Associations (India) as a whole.

TAI Delhi Unit from the group of larger Units was awarded Best Unit Trophy.

Office Bearers and representatives of TAI Delhi Unit is receiving the Best Unit Trophy by hands of Shri Hrishikesh Mafatlal

Mr. M.K. Mehra, Past President of The Textile Association (India) had been honored with a Memento by FAPTA during ATC-12, held on 23-26th October, 2013 at Shanghai, China for his outstanding contribution to FAPTA and ATC for which he could not attend the function.

Shri M.K. Mehra receiving the FAPTA Memento by hands of Shri Hrishikesh Mafatlal

Dr. H.V.S. Murthy, Chairman, PAC announced the name of Shri Hitesh V. Trivedi, the Student who received the Certificate for his excellent effort and secured highest in ATA Exam conducted by TAI during the year 2013.

Shri Hitesh V. Trivedi receiving the ATA Certificate by hands of Shri Hrishikesh Mafatlal

After the award presentation, the Souvenir / Book of Paper were released by hands of Chief Guest Shri Hrishikesh Mafatlal.

Then The Textile Association (India), South Gujarat Unit honored the eminent persons for their active support, meritorious services and significant contribution to the Association.

Wife of Late Shri Rajantkanth ji Seth

Mr. Navinbhai Mody, Vice President, TAI South Gujarat Unit

At the end, Chief Guest of event **Shri Hrishikesh Mafatlal ji**, Chairman, Mafatlal Industries Ltd., delivered his very informative and deeply review of industry. In his address, he reiterated that India remains in the forefront in textiles. He listed the key issues for achieving excellence as innovation, Eco-friendliness, social compliance, Skill development to suit to the level of technology, and R&D. He further pointed out the younger generation being demanding in both quality and price. In view of various facets of the developments, he reiterated that technology is the key factor for growth. Another important aspect of the growth towards excellence is sustainability factor, which is achieved through the recycling.

Mr. R.C. Patel, 1st Hon. Secretary of TAI South Gujarat Unit

Mr. Awiani, Founder Member of TAI South Gujarat Unit

Shri Hrishikesh Mafatlal ji delivering his address to the audience

Before the concluding of inaugural function **Shri Hrishikesh Mafatlal ji** was felicitated with the memento and this inauguration session was over with vote of thanks by Mr. Viren Jariwala.

Mr. Girishchndra Bhatt, President, TAI South Gujarat Unit is offering a Memento to the Chief Guest

In 2 days conference there were 6 sessions in which 14 papers and 4 Panel Discussions were presented from eminent Speakers from India & abroad during the conference. Some of the highlights of each session are as follows.

Session - 1 : "Present Scenario of Textiles "
"Global Textiles - Present Scenario"
By Mr. Arvind Sinha, Chief Advisor & CEO, Business Advisors Group, Global Sourcing Company

"Indian Textiles - A Way Ahead"
By Mr. Navdeep Singh Sodhi, Partner, Gherzi Textil Organization, Switzerland

: Panel Discussion - Indian Textiles - A Step Forward
Moderator: Mr. Prem Malik, Chairman, Confederation of Indian Textile Industry
Panel Members:
Mr. A.G. Kurian, AVP QA (Weaving), M/s Alok Industries Ltd.
Mr. Manish Pratap Daga, MD, PRD Cotton Group Company
Mr. Rajendra Agrawal, Chairman, Donear, Surat

Session - 2 : "Technology in Aid of Modernization"

Modernization of Indian Texurising Industry with Energy Efficient Autodoff eAFK Machines
By Mr. D. Ghosh, General Manager, Sales, Oerlikon Barmag Division

Warp Knitting - A Revolutionary Fabric Conversion Concept
By Mr. K.G. Shewale, General Manager, Warp & Circular Knitting, A.T.E. Enterprises P. Ltd.

Panel Discussion - Selection of Machinery for Different End Use Applications

Moderater: Mr. Avinash Mayekar, Managing Director, Suvin Advisors Pvt. Ltd.
Panel Members:
Mr. Nitin Bavkar, Director, Dornier Machinery India Pvt. Ltd.
Mr. Arun Nag, Vice President (Operations), Ginni Filaments
Mr. Nirav Naik, Production Manager, Virat Industries

Session - 3 : "Advance in Textile Processes"

Textile Speciality Chemicals: Global Prospects & Perceptions
By Mr. Anil R. Mehra, Chartered Colourist, Managing Director, Rajvin Chemicals Pvt. Ltd.

Innovations in Textiles for Footprint Reduction
By Dr. S.Y. Kamat, Vice President, Kothari InfoTech Limited (KITL)

Sustainable Textile Processing Concepts - Are we ready for 2020?
By Dr. Christian Schumacher, Head, Technical Marketing & Innovations, Colortex Ind. Ltd.

At the end of 1st day, there was a Entertainment Programme and followed by Dinner. It was very much exciting and every one made dancing with them on music.

2nd Day - Session - 4 : "Innovations in Textile Materials"

Innovations for Growth - Lead Surat
By Mr. J. Raghunath, Business Head (Polyester Textile Yarn), Reliance Industries Ltd.

Importance of Compliance in Textile Exports
By Mr. Sumit Gupta, GOTS

Panel Discussion - Weaving Technology-For Different Materials
Moderater: Mr. S. Tandon, CEO, Standon Consulting
Panel Members:
Mr. N.K. Brahmachari, MD, Amritlaxmi Group,
Mr. Chetan Lodhe, Vice President, Sales, Picanol
Mr. Makarand Madihali, ITEMA Weaving

Session - 5 : "Value Addition in Textiles"

Global Garment Industry - Overview and New Opportunities
By Mr. Ashesh Dhir, Founder & Director, Wisedge Consulting Pvt. Ltd.

Technical Textiles
By Dr. G.J. Kazi, Consulting Physician, Surat

Panel Discussion - Trends in Value Addition in Textiles
Moderator: Mr. Prashant Agarwal, Co-Founder & Jt. Managing Director, M/s. Wazir Advisors
Panel Members:
Prof. P.B. Jhala, Advisor, Plasma Textile Applications, FCIPT Institute for Plasma Research
Mr. Pratik Bachkaniwala, Technical Textiles
Mr. Parimal Vakharia, Digital Printing, Juhilene Fibres, Surat
Mr. Jignesh Shah, Director, Embroidery Control Systems P. Ltd.

Session - 6 : "Textiles in Asian Countries"

Doing Business with China
By Mr. Arvind Sinha, Advisor & CEO, Business Advisors Group, Global Sourcing Company

Impact on Currency Fluctuation
By Mr. V. Rajgopal, Consultant

All the Papers presented got very high response from the participants. There was good interaction between participants, who posed many questions to panel members and were answered very promptly by the panel members. All the sessions of panel discussions were very interesting and memorable. The delegates were intensely involved till the last session to take advantage of the panel discussion.

The last **Session 7** was the Valedictory Session, Dr. Chandan Chatterjee, Advisor (Project & Technology) iNDEXTb and Director, CEO, Government of Gujarat, was the Chief Guest for the function.

Dr. Chandan Chatterjee delivering his valedictory speech

Dr. J.J. Shroff, Techno-Scientific Consultant gave his impressions about the conference, and brought out some of the key factors to achieve excellence in the competitive world.

Dr. J.J. Shroff presenting his conference impressions

At the end of 2 days conference, Dr. P.A. Khatwani, Conference Secretary proposed the vote of thanks and he honored all the sponsors with the memento for their generous support to the conference.

The two-day Conference was attended by over 600 participants and it was a grand success. The organizers of the conference were happy to note that the objectives of the All India Textile Conference are fully achieved.

The Textile Association (India)
Next 70th
All India Textile Conference
will be hosted
by
VIDARBHA UNIT
during first week
of January 2015
at NAGPUR

OBITUARY

Shri M. D. Dixit
(1929-2013)

Shri M. D. Dixit very senior members & Past President of The Textile Association (India), Mumbai Unit expired on 21st December 2013. Shri Dixit served The Textile Association (India) in various capacities and was the President of Mumbai Unit during 1985-87. He was awarded Service Memento in the year 1997. He was very closely associated with The Textile Association (India), Mumbai Unit. Shri Dixit was Governing Council Member of Mumbai Unit during the year 1971, 1972, 1987-89 to 1999-2001. He was the Zonal Co-ordinator from 1991-93 to 1993-95 for The Textile Association (India), Central Office.

The Textile Association (India), Mumbai Unit has lost a guide and philosopher due to the death of Shri Dixit. His advice to the Mumbai Unit will be missing henceforth. We pray to the Almighty to bestow peace to the departed soul.

Shri P. C. Gupta
(1925-2013)

Shri P. C. Gupta very senior member of The Textile Association (India), Mumbai Unit passed away on 25th November 2013. He served The Textile Association (India) in many capacities and was very closely associated with Mumbai Unit. He was Hon. Treasurer from 1975-76 to 1976-77 and Vice Chairman from 1977-78 to 1983-84. Shri Gupta was Governing Council Member of the Mumbai Unit from1977-78 to 1984-85. He was awarded Service Memento in the year 1982.

He also served the TAI, Central Office as Hon. Treasurer in the year 1983-85 and took keen interest in coordinating various activities organized by the units.

The Textile Association (India), Mumbai Unit has lost a multidimensional member. We convey our heartfelt condolences to the Gupta family and pray to the Almighty to bestow peace to the departed soul.

Shri H. N. Asher

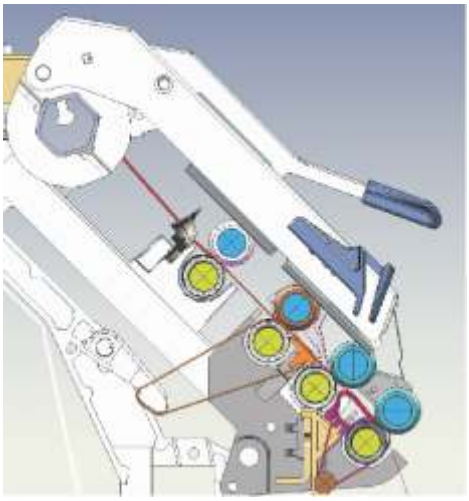
Shri H. N. Asher senior member of the Mumbai Unit expired on 27th November 2013 at the age of 77 years.

He was Jt. Hon. Secretary from 1973 to 1976 and Hon. Secretary of The Textile Association (India), Mumbai Unit during 1976-77.

We pray to the God to give everlasting peace to the departed soul and convey our condolences to his family.

RING FRAME LRJ 9 SERIES

Hi-Tech, Unique Suction Compact Spinning System



Ring frame LRJ 9 Series with upto 1824 spindles are designed with a blend of cutting edge technologies and proven LR9 series features to cater to the needs of compact yarn spinners. The superlative features of these machines are configured in every facet to deliver high quality yarn.

Salient Features

- Hi-tech, Unique Suction Compact System with Ease of Handling
- Maximum number of spindles up to 1,824
- AC Servo Drive for compact drive rollers - Flexibility in fine tuning the tension draft through display
- Duo Compact Nozzle
- Unique Suction Arrangement
- Synthetic apron with perforations - Less Maintenance and Longer life
- 4 QM drive for drafting with T-Flex drive
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Redg. No. R. N. 11386/57 (Formally Textile Digest)