January 2020 - December 2020 No. 4.1

SITRA *e* -Techletter

...News during the lockdown season

INSIDE THIS ISSUE...

PRODUCTIVITY CONCEPTS

FIBRE TO YARN CONVERSION COST - 2019

Of the three parameters that decide the profit margin in a spinning mill, viz. yarn selling price, raw material cost and conversion cost, the last mentioned one, to a large extent, is within the control of the managements. By utilising the various resources such as man, machine and material efficiently, the conversion cost can be controlled to a great extent.

Following are some of the salient findings of the study, based on the data on count-wise and item-wise fibre to yarn conversion cost furnished by the mills that participated in the 35th CPQ study (Costs, Operational performance and Yarn quality) covering the data for the fourth quarter of 2019 (October – December).

Total conversion cost in 2019

Table 1 shows the conversion cost particulars for 12 different counts and varieties of yarns.

It can be seen from Table 1 that the average conversion cost, in terms of per kilogram of yarn to increases as the count becomes finer, i.e. as low as Rs 53.7 in 24s CH to a high of about Rs 165.8 in 80s C-Comp. counts. Between mills, the conversion cost differed considerably in all the counts, i.e., Standard Deviation (SD) ranging from as low as 4 to more than 31 with the overall difference being high at 13. Such significant differences in the conversion cost between mills is largely due to the differences in the operational parameters like production rate, labour productivity, capacity utilisation, energy consumption, etc. and cost parameters such as wage rate, staff salary, power cost per unit, stores and packing materials cost, interest commitment and investment on plant and machinery and partly because of the in-correct method of estimation of yarn cost.

PRODUCTIVITY CONCEPTS

In terms of per kilogram per count, the conversion cost did not show any clear trend between counts. The conversion cost averaged at Rs 1.96 per kg per count with the cost ranging from Rs 1.56 to Rs 2.59 between counts, i.e. average ±0.52 paise. However, in terms of per spindle per shift, it showed a declining trend as the count became finer i.e. in 24s CH, it was around Rs 13 whereas in 80s, it was only about Rs 8.

Table 1 Count-wise total conversion cost
Period: October – December 2019

S. no.	Count	Conversion cost/kg of yarn (Rs)				Conv. cost/ kg/count (Rs)	Conv. cost/ spl./shift (Rs)@	No. of mills
		Avg.	Min.	Max.	SD			
1.	24s CH	53.7	45.7	58.2	5	2.24	13.0	4
2.	30s CH	62.0	55.0	67.1	5	2.07	12.0	5
3.	30s CH-Ex.	54.2	39.0	67.4	10	1.81	11.4	5
4.	30s CH-Comp.-Ex.	55.4	1.5	59.9	4	1.85	13.3	4
5.	40s C- Comp.	73.8	56.4	94.4	16	1.85	11.0	4
6.	40s CH-Comp.	62.5	53.1	67.3	6	1.56	9.7	4
7.	50s C-Comp.	79.1	67.1	92.9	11	1.58	8.3	4
8.	56s P/C-K	145.0	97.2	169.3	29	2.59	10.8	5
9.	60s C	131.1	111.6	146.9	12	2.19	8.3	6
10.	60s C-Comp.	115.5	91.3	186.7	25	1.93	8.4	13
11.	61s C-Comp.	112.6	105.2	117.5	5	1.85	8.0	5
12.	80s C-Comp.	165.8	134.4	220.3	31	2.07	7.7	6

'@' $\frac{\text{Conversion cost/kg of yarn x Prodn./spl./8 hours (g)}}{1000}$

Component-wise conversion cost in 2019

Table 2 shows the component-wise average conversion cost for all the 12 counts in terms of per kg of yarn.

Table 2 Component-wise conversion cost per kg of yarn (2019)
(Amount: Rs/kg of yarn)

S. no.	Count	YSP (a)	RMC (b)	Conversion cost							Net profit (a-b-c)
				SWC	Power	Stores & packing	Admn. OH	Int.	Dep.	Total (c)	
1.	24s CH	186.5	135.4	15.6	18.0	6.7	2.9	5.5	5.0	53.7	(-) 2.6
2.	30s CH	191.6	136.3	16.6	21.3	6.8	3.7	7.4	6.2	62.0	(-) 6.7
3.	30s CH-Ex.	196.4	108.6	12.0	20.5	7.4	3.0	4.2	7.1	54.2	33.6
4.	30s CH- Comp.-Ex.	228.7	165.0	9.7	19.7	7.1	3.1	7.2	8.6	55.4	8.3
5.	40s C- Comp.	220.9	142.2	13.0	30.9	9.1	3.2	6.4	11.2	73.8	4.9
6.	40s CH-Comp.	219.4	150.7	18.2	21.3	7.8	2.4	5.7	7.1	62.5	6.2
7.	50s C-Comp.	256.6	167.3	16.9	27.6	11.9	4.0	7.6	11.1	79.1	10.2
8.	56s P/C-K	158.2	101.0	47.2	31.8	5.2	7.5	50.9	2.4	145.0	(-)87.8
9.	60s C	263.6	163.0	34.1	48.1	10.0	7.5	18.5	12.9	131.1	(-)30.5
10.	60s C-Comp.	275.1	163.4	28.9	40.7	13.3	8.2	10.3	14.1	115.5	(-) 3.8
11.	61s C-Comp.	270.8	152.9	24.9	42.5	11.9	12.8	7.8	12.7	112.6	5.3
12.	80s C-Comp.	378.1	184.5	45.4	61.4	16.6	8.5	14.8	19.1	165.8	27.8

Note: (-) sign indicates net loss; SWC: Salaries and wages cost; OH: Overheads

Component-wise conversion cost also showed an increasing trend as the count becomes finer. For example, the salaries and wages cost in 24s CH averaged about Rs 15.6 per kg of yarn whereas in the fine counts (80s), it was almost 3 times higher at about Rs 45 per kg of yarn. The power cost which is around Rs 18 per kg of yarn in 24s count, was also 3 times high at about Rs 61 per kg of yarn in 80s count.

PRODUCTIVITY CONCEPTS

Changes in the movement of conversion cost between 2015 and 2019

The total conversion cost on the whole registered an decrease of about 6% in 2019 as compared to the conversion cost that prevailed in 2015 ranging from 4% to 9% in different counts (Table 3). This was mainly due to reduction in power cost during this period which in-turn was due to prudential usage of private power by participant mills.

Table 3 Changes in the total conversion cost between 2015 and 2019

S. no.	Count	Conversion cost/ kg of yarn (Rs)		Decrease in the conversion cost (%)
		2015	2019	
1.	40s C-Comp.	77.2	73.8	4
2.	60s C	137.8	131.1	5
3.	60s C-Comp.	127.5	115.5	9

Impact of NOV and conversion cost on profit margin

Profitability of a count is determined by the net-output-value (NOV) on one hand and the conversion cost on the other. The NOV is nothing but the difference between yarn selling price and clean raw material cost. Table 4 shows the changes that witnessed in the NOV, conversion cost and net profit in all the 3 counts between 2015 and 2019.

Table 4 Changes in NOV, conversion cost and net profit between 2015 and 2019

Count	2015					2019					Decrease in NOV (%)	Decrease in conv. cost (%)	Drop in net profit (%)
	YSP	RMC	NOV	Conv. cost	Net profit	YSP	RMC	NOV	Conv. cost	Net profit			
40s C-Comp.	224.4	125.3	99.1	77.2	21.9	220.9	142.2	78.7	73.8	4.9	20.6	4	78
60s C	252.4	131.0	121.4	137.8	-16.4	263.6	163.0	100.6	131.1	-30.5	17.1	5	286
60s C-Comp.	289.0	139.0	150.0	127.5	22.5	275.1	163.4	111.7	115.5	-3.8	25.5	9	117

The NOV, on the whole, registered a decrease in 2019 as compared to the NOV that prevailed in 2015 in all 3 counts ranging from 17% to 26%. However, the conversion cost recorded a decrease of about 6%, ranging from 4% to 9% between counts. Despite of decrease in conversion cost, all the three counts put together registered a huge drop in net profit (by 160%) with the drop ranging from 80% to 290% between counts, which is mainly due to drop in NOV.

For further details, SITRA publication, "An inter-mill study on fibre to yarn conversion cost - 8th study", Vol. 65, No. 2, May 2020 can be referred.

- Liaison & Consultation Division

YARN MARKET RECOVERY AFTER 7 YEARS

SITRA is regularly conducting a monthly online survey on raw material cost and yarn selling price since April 2013. As of December 2020, 91 surveys have been completed with a decent participation of around 60-80 mills during every month. This survey portrays the trend in the movement of yarn selling price and its corresponding raw material cost. In addition to having a comparison of the commercial factors, this survey has its uniqueness in enabling a participant mill to compare the corresponding yarn quality attributes, production rate and yarn selling price realized by their competitors. Based on the information provided in the survey report, many mills have reported to have benefitted in optimizing their both commercial and operational efficiencies.

Towards measuring the trend in the movement of overall commercial efficiency of cotton yarns, SITRA has developed an index viz., Market Performance Evaluation Index (MPEI) which is based on the average net output value [yarn selling price – raw material cost] in terms of Rs per kg of yarn for the 12 popular counts (40s K, 40s C, 60s C, 80s C, 40s C-Comp., 50s C-Comp., 60s C-Comp., 80s C-Comp., 100s C-Comp., 30s CH, 40s CH and 30s CH-Ex.). This MPEI is an arithmetic index that is derived having April 2013 as the base month and the base index set as 100 for that month.

The trend in the movement of MPEI since April 2013 is shown in Figure 1.

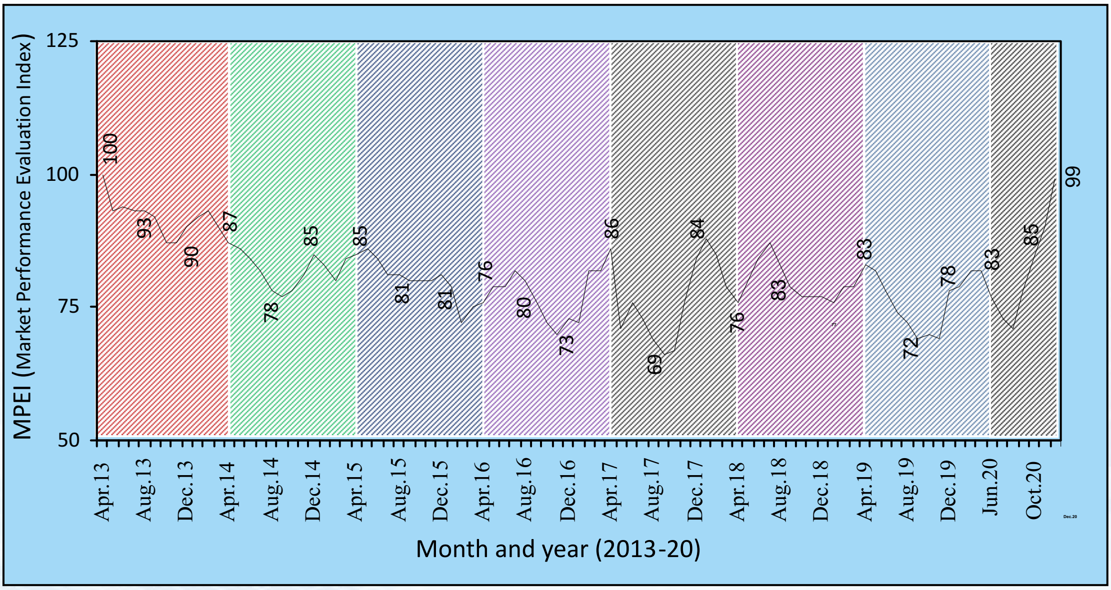


Figure 1 Market Performance Evaluation Index (MPEI)

The above figure shows a gradual reduction in MPEI value with each year and reached the yearly average of 77 in 2016-17 (Table 1). Since 2016-17, the yearly average MPEI level was noticed to hover around the same value.

Table 1 MPEI values between years (2013 – 2020)

Productivity Concepts

Table 1 MPEI values between years (2013 – 2020)

Year	Market Performance Evaluation Index (MPEI)		
	Avg.	Min.	Max.
2013-14	92	87	100
2014-15	82	77	87
2015-16	80	72	86
2016-17	77	70	82
2017-18	77	66	88
2018-19	79	76	87
2019-20	77	69	83
2020-21*	82	71	99

'' for the period June – December 2020*

During lockdown period, there was a complete halt in yarn manufacturing process and many mills focused on meeting the mandatory government regulations. Due to a gradual withdrawal of lockdown restrictions, the fabric & garment manufacturing units have started to cater to the market needs. Nevertheless, spinning mills could start their operations only with limited capacity utilization owing to non-availability of sufficient work force and meeting the government mandatory regulations at the work place. At the same time, the new cotton crop has also started arriving in the market with limited demand from spinning mills. However, the price(s) of cotton, being in the commodity market, has witnessed only a marginal reduction. But, due to widening of supply-demand gap of yarn, the yarn prices have started to increase substantially. Since September 2020, the yarn selling price index (YSPI) increased by 4 points every month and was 103 in December 2020 (Figure 2). This substantial increase in yarn selling price has resulted in an overall increase in the net output value which in turn has resulted in MPEI recovery close to the base level that existed during April 2013.

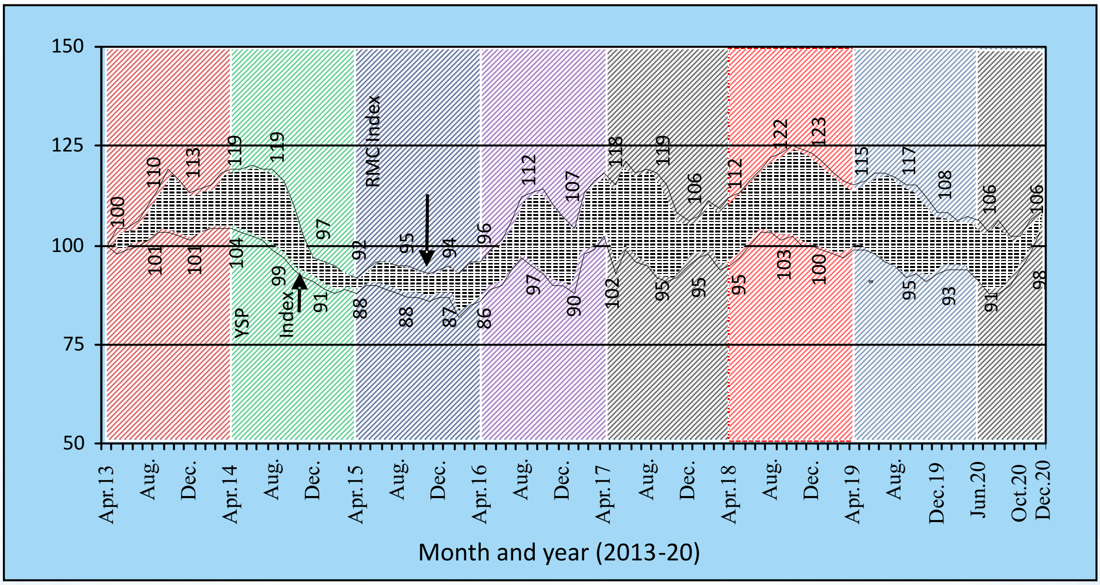


Figure 2 Yarn selling price index (YSPI) and Raw material cost index (RMCI)

- Liaison & Consultation Division

CRITICAL AREAS MOSTLY MISSED DURING MAINTENANCE AND THEIR IMPACT ON YARN QUALITY IN SPINNING MILLS (PART - I)

In the latest generation machines in the spinning process, blow room and carding play a vital role. Both these processes work almost in tandem and are seldom stopped. Even with proper scheduled maintenance practices in place, mills still miss out on certain crucial aspects. Here we share a few critical observations based on the Machine audits and Quality audits conducted by SITRA in many mills.

Blow room

Bale plucker

The objective of bale plucker is to reduce the tuft size from the bale cotton and feed the material to the sub-sequent machines automatically. Most of the time, mill maintenance personnal change the opening roller / profile for physical damages. However, the sharpness of the opening roller / profile is equally important. If the opening roller is blunt, material may not be taken up immediately and can result in tumbling. This condition demand higher take-up depth to match the feeding demand. This in turn affects the level of opening, leads touneven feeding and generation of neps by the bale plucker.

Figure 1 Damaged plucking roller

Transport fan

In blow room lines, there are two types of material transport between machines. One is by the use of condensers and the another method is use of transport fans. The use of transport fan is most common for short distance material transport. The transport fans are of radial type, which suck the material axially and deliver the material radially. Due to this, the entire quantity of material touches the fan vanes at higher speeds during material transport. Prolonged usage of cotton with heavy trash will damage the fan vanes which is unnoticed most of the times due to the absence of a view glass / inspection door. Material sucked axially and striking the damaged vanes surface will cause nep generation.

Figure 2 Damaged vanes of TV fan

Material duct

The length and diversions in the material transport line of blow room is based on number of machines in the sequence, equipment (contamination clearer) and bye pass provisions. In general, too many acute bends in the material transport line tend to reduce the material velocity in the line, which is normally taken care of by increasing the fan speeds to match with the recommended material flow velocity. Too high a fan speed with too many acute bends makes the material to whirl inside the duct and strike at the bends at a higher velocity. This leads to greater nep generation.

Figure 3 More no. Of bends in the blow room line

Know Your Instrument

GC-MS/MS

Chromatography is primarily a separation tool which involves a non-destructive process for resolving a multi-component mixture of traces, minor or major constituents into its individual fractions. Chromatography is based on Partition Coefficient in which a compound describes the way in which it is distributed itself between two immiscible phases.

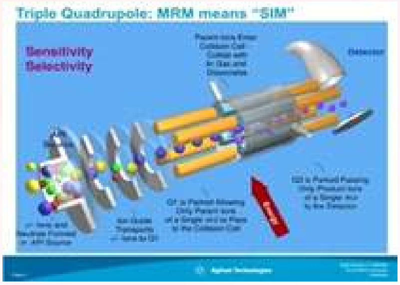
Concentration in Solvent A / Concentration in Solvent B = K_d
Kd — Partition Coefficient (or) Distribution Coefficient

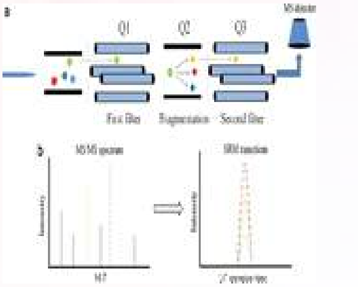
Applications of Chromatography ranges from environmental analyses, chemical syntheses, polymer characterizations to toxicological investigations. Pharmaceuticals and textiles require chromatographic techniques that provide increased resolution, molecular structure elucidation, sensitivity and separation power, along with decreased analysis times and detection limits

The different Chromatographic techniques include Paper Chromatography, Column Chromatography, Ion Exchange Chromatography, Thin Layer Chromatography, Gel Permeation Chromatography, Adsorption Chromatography and Gas Chromatography.

SITRA has recently procured the **GC-MSMS – Gas Chromatography Mass Spectrometry – Triple Quad** instrument to fulfill the industry requirements as per latest stringent regulations. The instrument provides for detection of molecular ions up to m/z 105 and characteristic fragmentation of daughter ions. The instrument is an useful addition to SITRA's laboratory and help in carrying out the following tests for textile material in all forms like grey fibre, yarn, knitted fabric, woven fabric, dyed textiles, printed textiles, technical textiles, medical coated/laminated textiles, etc.

- Pesticides
- Chlorophenols (Pentachlorphenol / Orthophenyl phenol)
- Cleavavable aryl amines
- Chlorinated organic carriers (COC)
- Organotin compounds (OTC) / Organo metallic compounds (OMC)
- Phthalates
- Poly aromatic hydrocarbons (PAH)
- Poly chlorinated biphenyls (PCB)





In an identical manner to Gas Chromatography, samples being analyzed by GC-MS/MS are separated in a gaseous state based on the various physical and chemical properties of analytes of interest and their interaction with the analytical column's stationary phase. Upon exiting the analytical column the analytes enter the tandem mass spectrometer (MS/MS) which consists of two scanning mass analyzers separated by a collision cell. Fragments selected in the first analyzer are reacted with an inert gas in the collision cell, resulting in further fragmentation. These daughter product ions are then resolved in the third quadrupole for analysis.

GC-MS/MS analysis can be performed on liquids, gases or solids. For liquids, the sample is directly injected into the GC. For gases, gastight syringes are used to transfer the gaseous components directly into the GC. For solids, the analysis is carried out either by solvent extraction, outgassing or pyrolysis analysis. The analytes of interest are then quantified through comparison to external or internal standards. In addition to the quantification, GC-MS/MS is well suited for the identification of unknown volatile components using the mass fragmentation patterns and mass transitions associated with the unknown analyte.

Ideal Uses of GC-MS/MS
- Volatile analyte identification
- Complex matrices
- Low level quantification

Limitations
- Sample must be volatile or capable of derivatization.

Strengths
- High sensitivity EI source
- Ultimate sensitivity and selectivity
- Large mass range up to 1050 m/z
- Quantitative analysis

GOTS Audit / Certification & Analytical Tests

In principle, any product that can be considered as a textile fibre product is covered under this Global Organic Textile Standards, latest version 6.0. GOTS sets criteria that is stringent yet practical and is relevant in major textile products. Local or national legal requirements vary across the world If the local laws provide higher protection to environment or people, they shall be followed. Similarly, where local laws provide lower protection as compared to GOTS criteria, GOTS criteria would take precedence for the Certified Entities. This is applicable to all aspects of the standard criteria, including environment, social, building safety, legality of business, and so on.

Processors, manufacturers, traders and retailers that have demonstrated their ability to comply with the relevant GOTS criteria in the corresponding certification procedures to an Approved Certifier receive a GOTS Scope Certificate issued in accordance with the 'Policy and Template for issuing Scope Certificates (SCs)'. Accordingly, they are considered Certified Entities. Scope certificates list the products/product categories that the Certified Entities can offer in compliance with the standard as well as the processing, manufacturing and trading activities that are qualified under the scope of certification.

The chemicals which are present in textiles that are explicitly banned or restricted for environmental and/or toxicological reasons in all stages of GOTS goods.

Based on chemistry and industry practices, the following are guidance risk parameters for different categories of chemical inputs:

Table 1: Suggested test parameter matrix for GOTS chemical inputs:

Parameter	Dyes	Pigments	Printing Inks	Printing Auxiliaries	Dyeing Auxiliaries	Pre-treatment & Finishing Auxiliaries
AOX	√	√	√			
AP/APEO	√	√	√	√	√	√
Heavy Metals	√	√	√	√	√	√
Formaldehyde			√	√	√	
Banned Amines	√	√	√			
Chlorophenols	√	√				
Phthalates				√		
PVC			√			

GOTS Audit / Certification & Analytical Tests

Table 2: Suggested test parameter matrix for GOTS goods, residues & Quality

Parameter	Grey Fabric	Printed Fabric	Dyed Fabric	Processed / Undyed Fabric	Metallic Accessories	Other Accessories	Sewing Thread
Sensitizing / Allergenic Disperse dyes							√
AOX	√	√	√	√			√
AP/APEO	√	√	√			√	√
Lead / Cadmium	√	√	√	√	√	√	√
Extractable Heavy Metals	√	√	√	√	√	√	
Nickel Release					√		
Formaldehyde	√	√	√	√			
Banned Amine		√	√			√	√
Chlorophenols	√			√			
Phthalates		√	√			√	
pH Value		√	√	√		√	
Colour Fastness & Shrinkage		√	√	√		√	√

Table 3: Suggested test parameter matrix for GOTS goods, residues & Chemical inputs (Applicable only for spinning / knitting / weaving mills) from SITRA

Material	Pesticides	Chlorophenols	AP / APEO	Heavy Metals	Formaldehyde	Banned Amines	Phthalates	PVC
Grey Fibre	√	√	√	√				
Grey Yarn	√	√	√	√				
Grey Knitted Fabric	√	√	√	√				
Grey Woven Fabric	√	√	√	√				
Spindle oil / Knitting oil / Weaving oil				√				
Wax Roll				√				
Polythene Bag / Bale Covers								√
Dyed Fibre / Yarn / Fabric			√	√	√	√		
Printed Fabric			√	√	√	√	√	
Coated / Laminated Sheets								√
Surfactants			√	√				

Apart from the above, the product which is produced for Medical Textile application, Food Contact Textiles, Food Packing Textiles also comes under GOTS category.

SITRA is having full fledged testing facility for all the above parameters. SITRA is also accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) as per ISO/IEC 17025: 2017 and the test reports are accepted by GOTS for certification.

ANALYTICAL TEST FACILITIES

In today's highly competitive business world, every company needs to ensure the quality of their products. In view of the following requirements of the mills and chemical manufacturers, SITRA has upgraded the facilities with state-of-the-art instruments like GC-MSMS, LC-MSMS, ICP-MS, etc to fulfill the testing requirements for eco friendly products.

- Certifications viz., Global Organic Textile Standard (GOTS), Organic Exchange, Global Recycling Standard (GRS), Oeko-Tex 100, Detox to Zero
- To improve and enhance the quality of their products in line with International standards
- To ensure compliance of their goods for export

Now-a-days, textile materials play a major role in Food Contact Textiles (FCT) and Food Packing Textiles (FPT). It is mandatory for every manufacturer to ensure the products' hazard free nature while contact with food. As per national or international certification bodies like ISO, GOTS, OEKO-TEX, etc., the products should undergo some major tests to ensure free from toxic chemicals.

Mills can test their raw materials, wax rolls, lubricating agents, bale covers, Polythene covers, etc. The test reports contain the test results, criteria for pass/fail, and the interpretations (whether the product test results lies within the criteria or not).

WATER TEST FACILITIES

The quality of water which is used for industries at designated places and intended use plays a major role. It is important to understand what is and isn't there in your water. The water needs to be tested to check whether the water quality is in compliance with the standards and its suitability for the designated use. Testing is also essential to ensure the compliance of water quality with the respective rules and regulations.

As per the requirements of Government bodies like BIS, MoEF, USEPA, CPCB, TNPCB, Inspector of Factories, etc., drinking water, raw and treated effluent / sewage water from the industries must be tested regularly in order to meet the compliance requirements. We can detect thousands of harmful chemicals and bacteria in the water. However, each of the specifications / packages requires only a set of parameters to be tested.

SITRA have full test facilities to analyse all the types of waters like:

1. Water for drinking purpose
2. Water for humidification plants
3. Water for boilers
4. Water for Textile processing industries
5. Water for Processed food industries
6. Water for swimming pool
7. Water for sizing industries
8. Water for construction purpose
9. Water for Lab use
10. Effluent water analysis as per PCB norms
11. Water from STP/ETP

SITRA has the capability to test all the above parameters using national/international standard test methods as stipulated by the regulatory bodies.

TEXTILE TITBITS

www.podgraphics.com

Artificial muscles made with textile fibres - 16 July 2019 WTIN

Over the last 15 years, researchers at the University of Texas at Dallas and their international colleagues have invented several types of strong, powerful artificial muscles using materials ranging from high-tech carbon nanotubes (CNTs) to ordinary fishing line.

In a new study published on 12th July in the journal of Science, the researchers describe their latest advance, called sheath-run artificial muscles, or SRAMs. The research group's previous muscles were made by twisting CNT yarn, polymer fishing line or nylon sewing thread. By twisting these fibres to the point that they coil, the researchers produced muscles that dramatically contract, or actuate, along their length when heated and return to their initial length when cooled.

To form the new muscles, the research team applied a polymer coating to twisted CNT yarns, as well as to inexpensive nylon, silk and bamboo yarns, creating a sheath around the yarn core. “In our new muscles, it is the sheath around a coiled or twisted yarn that drives actuation and provides much higher work-per-cycle and power densities than for our previous muscles,” says Dr Ray Baughman, corresponding author of the study.

In their experiments, a key step to making the finished muscles was to twist the newly coated yarns until they coil, while the sheath material was still wet.“If you insert twisting or coiling after the sheath has dried, the sheath will crack,” Baughman explains. “Optimising the thickness of the sheath is also very important. If it is too thick, the twisted yarn at the core won't be able to untwist because the sheath is holding it in place. If it is too thin, the untwisting of the yarn will cause the sheath to crack.”

Dr Jiuke Mu, lead author of the study and a research scientist with the NanoTech Institute, first developed the concept of the sheath-run artificial muscle. In the sheath-run configuration, the outside sheath absorbs energy and drives the actuation of the muscle. When operated electrochemically, a muscle consisting of a CNT sheath and a nylon core generated an average contractile power that is 40 times that of human muscle and nine times that of the highest power alternative electrochemical muscle.

“Since the SRAM technology enables the replacement of CNT yarns with cheaper yarns, these muscles are very attractive for intelligent structures, such as robotics and comfort-adjusting clothing.” To demonstrate possible consumer applications of sheath-run artificial muscles, the researchers knitted SRAMs into a textile that increased porosity when exposed to moisture. They also demonstrated a SRAM made from polymer-coated nylon thread that linearly contracts when exposed to increasing glucose concentration. This muscle might be used to squeeze a pouch to release medication to counteract high blood sugar.

The research was funded by several sources including the Air Force Office of Scientific Research, the Office of Naval Research, the National Science Foundation, the Robert A Welch Foundation, the Australian Research Council, the National Research Foundation of Korea, and the Science and Technology Commission of Shanghai Municipality.

PPEs testing by SITRA

During the COVID-19 peak in the year 2020, SITRA's CoE-Meditech division was in the forefront of testing and certifying PPE test samples (based on MoT's directions). Amid many challenges, SITRA was able to certify close to 2000 coverall manufacturers and 1300 fabric manufacturers.

From July, 2020 the MoT has issued new guidelines for shift in the certification process wherein a new regime ensures that the process is done by BIS even as SITRA continues to receive samples from customers for the testing process alone.

SITRA has received appreciation from the Ministry of Textiles, Govt. of India for its role in the process of testing and certifying PPE coveralls.

SITRA has in the meantime, has equipped its laboratory to ensure that it is able to test PPEs as per various international standards. With BIS also formulating some additional standards for coveralls, SITRA has a full range of equipment to test PPEs. The recent additions to the laboratory include the Wet Bacterial Penetration Resistance Tester and an Automatic colony counter.

SITRA's Calibration Laboratory receives NABL Accreditation

We are pleased to inform that the National Accreditation Board for Testing and Calibration Laboratories (NABL) has granted accreditation, in accordance with ISO/IEC 17025:2017, to SITRA's calibration laboratory for Mechanical, thermal and Electro technical calibrations (Accreditation certificate no. CC-2678 dt. 28.07.2020 valid up to 27.07.2022) for the following parameters :

- Dimensions
- Volume
- Temperature
- Specific heat and Humidity
- Timer
- Temperature simulation
- Pressure & vacuum
- Speed
- Weights
- Weighing balances
- Force – Tensile testing

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

THE SOUTH INDIA TEXTILE RESEARCH ASSOCIATION (SITRA) CALIBRATION LABORATORY

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

13/37, AVINASHI ROAD, AERODROME POST, COIMBATORE, TAMIL NADU, INDIA

in the field of

CALIBRATION

Certificate Number: CC-2678

Issue Date: 28/07/2020 Valid Until: 27/07/2022

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

TRAINING PROGRAMMES

Training programme on 'Yarn Realisation and Waste Control"

With an aim to sensitize technicians in the spinning industry on crucial aspects of yarn realisation and means to controlling wastes, SITRA conducted a two-day training programme which covered topics such raw material quality evaluation (cotton/synthetics), optimization of waste extraction, yarn realization estimation & accounting procedures, invisible loss and its control in spinning mills. Fifty seven technicians from 37 mills participated in the programme.

Training programmes on "Functional skills in testing & quality control for lab technicians"

A 4-day training programme meant for the technicians working in quality control / testing laboratories, merchandisers, exporters, etc. was conducted in January 2020. Thirty one participants attended this programme which covered topics like sampling techniques, testing of construction parameters of woven and knitted fabrics, colour theory & computer colour matching, colour fastness, inspection of garments and specific tests for garments, care label instructions, eco parameters, etc. Apart from the theoretical sessions, participants also had the opportunity to have practical demonstrations at the laboratories.

Management orientation programme

At the request of M/s. Sri Mahasakthi Mills, Chittur, SITRA conducted a fourteen days training programme for one of their executives towards providing sufficient orientation on the technical skills and key areas of focus in managing a spinning mills . Important topics like present textile scenario, process control in spinning, weaving, processing and knitting, production and productivity, yarn realization and waste control, yarn faults and fabric defects, on-line quality control and monitoring practices in spinning mills, cost optimization and control in spinning mills, textile chemical processing, etc., were covered during the programme. The programme was held during 4 – 21 September, 2020.

Webinar on changing over to HVI mode of Testing in Cotton Fiber Evaluation

SITRA organised a Webinar on "Changing over to HVI mode of testing in cotton fibre evaluation on HVI" with the intention to highlight to quality control technicians of spinning mills the key aspects in switching to the HVI mode of testing. The technical session was handled by Mr.Murali Ganesh, Product Support Manager, USTER Technologies, India on Wednesday, the 25th November 2020 and was attended by 44 techniicians representing 34 mills.

Training programme on fibre testing

At the request from M/s Coimbatore Polytex Ltd, Arasur, Coimbatore SITRA conducted one day training programme which covered the crucial aspects involved in fibre testing using the PREMIER Art3 equipment. Eight QC personnel of the mill attended the programme that can held during 27th to 29th October, 2020.

Training programme on defect analysis

At the request of M/s. Kikani Exports Ltd, Coimbatore, SITRA conducted a 3-day training programme for 7 of their quality control personnel which covered topics like types of defects and their mode of occurrence, fiber faults yarn faults, wet processing faults, dyeing faults, etc.

TRAINING PROGRAMMES

Refresher Training Programmes

At the request of 2 testing laboratories in Tirupur, SITRA conducted three refreshers training programmes for the laboratory technicians covering hands-on testig on instruments, testing methods and key laboratory practices for accredited labs. Seven technicians participate in the refresher programmes that were held during February and March, 2020.

Online Assessment of Trainers/Assessors

The Textile Sector Skill Council (TSC) under the National Skill Development Council (NSDC) has recognized and certified training personnel of SITRA as Master Trainers eligible to conduct TOTs for trainers who train persons in textile mills for various job roles. Master trainers are also eligible to conduct assessment of the trainers. Post-COVID-19, TSC has created protocols and guidelines for carrying out online assessment of trainer on both domain and other skills. Under request from TSC, SITRA conducted online assessments for 6 trainers on the jobs roles of ring frame tenter and autoconer tenter.

Skill development programmes under NBCFDC Scehme

The NBCFDC scheme initiated by the Ministry of social justice & Empowerment, Govt. of India, aims to leverage the strength of institutions like SITRA for enhancing capabilities for skill development or personnel from the backward classes. Under the scheme, SITRA trained 16 operatives from 2 mills for a period of 38 days in tenting jobs in te Autoconer department. The programmes were conducted in Tamil.

Pre-employment training and retraining programmes for textile workers

Three out-station mills availed SITRA's training services to train their operatives wherein 2 batches involving 191 operatives were trained in spinning department operation and one batch of 20 operatives were trained on fabric inspection. The training programmes were conducted in Tamil, Malayalam and Telugu.

PAPER REVIEW

Elastic recovery properties of polyester-cotton blended Eli Twist yarns

Bhavna Choubisa, S K Sinhaa & Madan Lal Regar
Department of Textile Technology, National Institute of Technology, Jalandhar 144 011, Indian Journal of Fibre & Textile Research Vol. 44, December 2019, pp. 420-423

The authors have used polyester (1.2 denier, 38mm) and cotton (4.2 mic, 30mm) fibres to produce homogeneous and blended yarns. Eli Twist yarns (29.5 tex) were produced on Lakshmi short staple spinning line with Suessen Elite compact set. In order to produce blended yarn, the blending of combed cotton fleece with polyester was done at the blow room stage. The yarns were spun with twist factor 40 (tpc × tex½) at 17000 rpm spindle speed. In the Eli-Twist system, the distance between the two roving strands in drafting system and the negative pressure were kept 8 mm and 28-35mbar respectively.

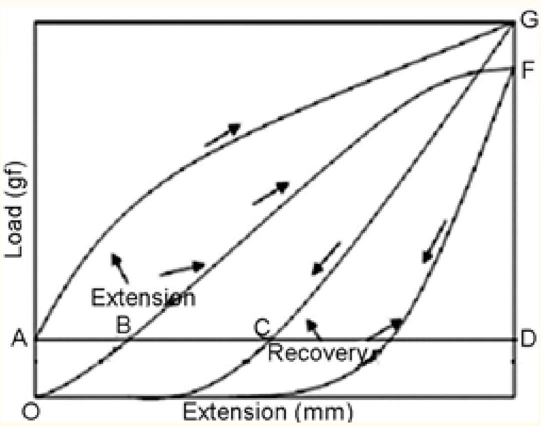


Fig. 1 Extension cycling for evaluation of elastic recovery parameters

Immediate elastic recovery (%) = [CD / AD] × 100
Delayed elastic recovery (%) = [BC / AD] × 100
Permanent deformation (%) = [AB / AD] × 100

Comparative Assessment of Elastic Behaviour of Eli- Twist and Ring-spun TFO Yarn

Typical results are reported by the authors for recovery properties of equivalent Eli-Twist and ring-spun TFO yarns made from 65/35 P/C fibre mix (Table 1). It was observed that the immediate and delayed elastic recovery values of ring-spun TFO yarn were higher than that of Eli-Twist yarn. The permanent deformation, however, was higher for Eli-Twist yarn. A high degree of compactness in yarn structure restricted the rearrangement of fibre during relaxation. Hence, Eli- Twist yarn showed poor recovery behaviour compared to equivalent ring spun TFO yarn polyester content.

Table 1 Recovery properties of Eli-Twist and ring-spun TFO yarn at 2% extension

Yarn	Immediate Elastic Recovery (%)	Delayed Elastic Recovery (%)	Permanant deformation (%)
Eli-twist	25.42	40.12	34.46
TFO	29.23	42.39	28.38

The authors have summarized their findings as below:

Ø Immediate elastic recovery increases with increase in polyester content in fibre mix and increase in extension rate. However, it decreases with an increase in amplitude of extension.

Ø Delayed elastic recovery initially increases and after certain level again decreases with reduction in polyester content.

Ø Delayed elastic recovery decreases with an increase in extension rate. An increase in amplitude of extension increases the permanent deformation of the structure, but its effect on delayed elastic recovery is not clear.

Ø The permanent deformation increases with decrease in polyester content in the fibre mix and amplitude of extension. However, it decreases with increase in extension rate.

- Spinning Division.

PAPER REVIEW

Mechanical properties of copper/cotton core-spun yarns produced by siro and ring spinning methods

Hamed Mohammadi Mofarah, Saeed Shaikhzadeh Najar a & Seyed Mohammad Etrati

Department of Textile Engineering, Amirkabir University of Technology, Tehran, Iran, *Indian Journal of Fibre & Textile Research Vol. 44, December 2019, pp. 431-436*

The authors have used combed cotton roving with linear density of 716 tex sheath material. The tensile strength and elongation of cotton fibres were 28.2 cN/tex and 7.1% respectively. Copper wires (diameter 0.06, 0.07 and 0.08 mm) were taken as core materials. Mechanical properties of copper filaments were measured on an Instron 5566 tensile tester. For each copper filament, 8 samples were tested. Cross- head speed was set in such a way that the breaking time remains 203 s. The gauge length of each sample was 25 cm.

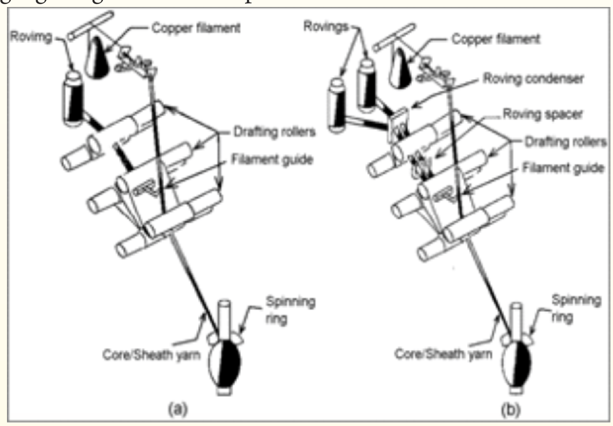


Figure1 Schematic diagram of experimental set-up to produce (a) conventional ring-spun, and (b) siro core-spun copper/cotton yarns

Table 1 Specification of copper/cotton core-spun yarn

Sample code	Yarn Count (Tex)	Yarn Diameter (mm)	Spinning Method
C06	65	0.33	Conventionl Method
C07	74	0.40	Conventional Method
C08	85	0.45	Conventional Method
S06	65	0.34	Siro
S07	74	0.37	Siro
S08	85	0.40	Siro

Increasing the diameter of core copper component led to a decrease in yarn tensile strength (Figure 2a). Similar results were also obtained by Bedeloglu et al.15. They showed that by increasing diameter of copper component, breaking force and breaking work of copper/cotton core-spun yarns decrease. Also, Ramachandran et al.19 observed that the increase in core contribution in the yarn structure decreases the breaking tenacity values.

The difference between yarn elastic modulus values in both spinning methods increased with increase in copper diameter (Figure 2b). However, samples C06 and S06 have similar elastic modulus. It is also found that the increase in copper diameter for siro core-spun yarns does not represent significant effect on yarn elastic modulus. Nevertheless, increasing the copper diameter sharply decreased the ring- spun copper/cotton core yarn elastic modulus.

Increase in yarn diameter and copper core wire led to increase in bending rigidity of copper/cotton core-spun yarns (Figure 2c).

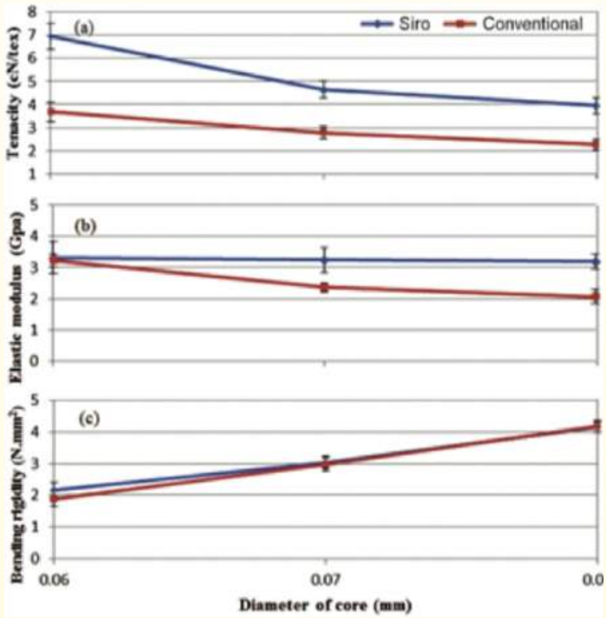


Figure 2 Copper/cotton core-spun yarns (a) tenacity, (b) elastic modulus and (c) bending rigidity against copper diameter

Paper Review

The authors report that with an increase in copper core diameter the cover factor of copper/cotton core- spun yarns decreases in which the ring conductive yarns demonstrate higher cover factor than siro conductive yarns. Also, the elastic modulus of siro core-spun yarns were higher than that of conventional ring core-spun yarns. In addition, an increase in diameter of core part in conventional ring core-spun samples caused a sharp decrease in amount of elastic modulus. However, the elastic modulus of siro core-spun yarns remained unchanged with copper core diameter. It is also reported that increasing the core copper diameter led to a decrease in yarn tensile strength in which the siro copper/cotton core-spun yarns exhibited higher values than conventional ring copper/cotton core- spun yarns.

- Spinning Division

Consultancies offered by SITRA

S. no.	Nature of consultancy service	No. of services offered
1.	Water consumption and time study of soft flow / yarn dyeing machines.	79
2.	Monthly inter - mill surveys	69
3.	Estimation of modernisation Index for NTC- SRO mills	17
4.	Liaison visit - member mills	17
5.	Development of yarn costing system	4
6.	Energy audit.	3
7.	Optimisation of man power for staff, maintenance operatives and cone winding dept. operatives	2
8.	Air compressor study.	1
9.	Staff optimisation study	1
10.	Modernisation cum rehabilitation study and Work assignment study	1
11.	Yarn costing study	1
12.	Techno- economic viability study	1
13.	Development of new costing system	1
14.	Assessment of laboratories for NABL accreditation purpose	1
15.	Work assignment study	1
16.	Diagnostic study	1
17.	Study on technical textile industry for TIDCO	1

Besides the above consultancy studies, SITRA made 17 liaison visits to mills, solved 2 adhoc problems regarding UKG conversion factors, attended 2 Technical trouble shootings, tested 796 accessory samples and also calibrated 869 instruments.

Staff News

Meetings Attended

Dr. Prakash Vasudevan, Director, SITRA attended the following meetings:

- Meeting to review the supply of arrangements of Masks and protective gears for health workers under the Chairmanship of Shri Nihar Ranjan Dash, Joint Secretary, MoT, Delhi
- Field visit followed by discussion with prospective investors and industry allocations at Andhra Pradesh MedTech Zone Ltd (AMTZ), Visakapatnam, on 2nd March.2020.

Research publications

N. Sudhapriya et al., Dyeing of textiles with natural dyes extracted from Terminalia arjuna and Thespesia populnea fruits. Ind Crops Prod, 2020, 148, 112303. Impact factor: 4.244

N. Sudhapriya et al., H2O mediated one-pot, multi-component synthesis of isatin derived imidazoles as dual-purpose drugs against inflammation and cancer. Bioorg chem, 2020, 102, 104046. Impact factor: 4.831

Lectures delivered

S. Sivakumar, Head – Textile Chemistry & CoE Medical Textiles presented a paper on "Opportunities and Challenges in Medical Textiles" during the Online conference on "Exploring the Expectations and Executions in Scientific Research – EEESR 2020" organized by Mother Teresa Women's University, Kodaikkanal on 17.07.20.

S. Sivakumar, Head - Textile Chemistry & CoE Medical Textiles and staff of CoE Medical textiles department presented plenary papers on Emerging Opportunities in Medical Textiles, Government norms & regulations for PPEs, Coverall manufacturing methods and requirements, Facemask manufacturing methods and requirements, etc during the webinar on Manufacture & Export of PPEs organized by MSME Technology Development Centre, Madurai during 11th and 12th August 2020.

•

The South India Textile Research Association
13/37, Avinashi Road, Coimbatore Aerodrome Post, Coimbatore - 641 014,
Phone: 0422-2574367-9, 4215333, Fax: 0422-2571896, 4215300
E-mail:info@sitra.org.in, Website: www.sitra.org.in