

# OFFICE OF THE TEXTILE COMMISSIONER

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## Interim Report

Baseline survey of the technical textile industry in India

**Mar 2014**

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**ICRA Management Consulting Services Limited**

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## **Part A. Project Background**

## **1. Introduction**

The Ministry of Textiles (MoT) is responsible for policy formulation, planning, development, export promotion and trade regulation in respect of the textile industry. In line with this agenda, the Ministry of Textiles has undertaken several developmental activities that are oriented towards providing necessary support to promote growth of Technical Textile industry in India.

Technical textiles are textile materials and products used for their technical performance and functional properties. Unlike conventional textiles used traditionally for clothing or furnishing, technical textiles are used basically on account of their specific physical and functional properties and mostly by other user industries. The market for technical textiles is expanding as the products are being put to use by an ever-increasing number of end users in various industries such as agriculture, clothing, construction, health care, transportation, packaging, sports, environmental protection, protective wear, and more. The global market for technical textiles is expected to continue its growth, driven by the expanding use of these products particularly non woven in emerging markets like Asia, because of increased levels of consumption and production, availability of skilled labour, and developing infrastructure facilities. The global technical textile industry is currently dominated by products from China and the European Union. Developing countries in Asia have the advantage of becoming production centres for technical textiles due to their cost advantages.

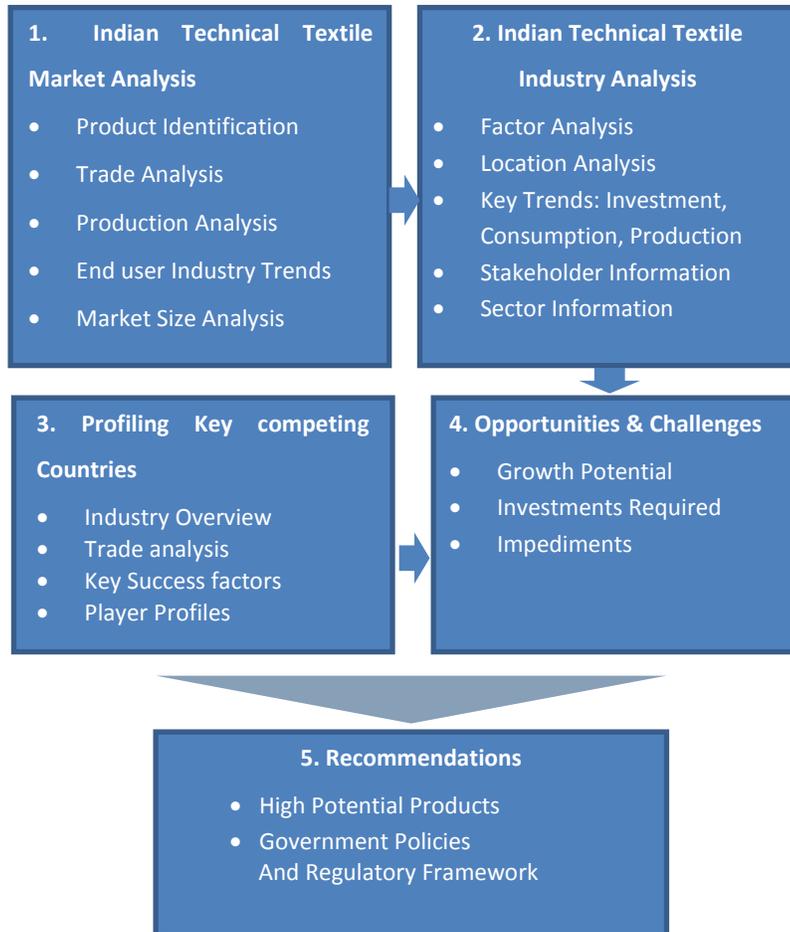
A baseline survey that provides comprehensive information on all aspects of the technical textile industry in India is imperative for understanding the past developments and progress in the sector and for identifying key challenges, growth potential and opportunities. Under the 12th five year plan scheme of the Government, MoT through the Office of the Textile Commissioner has planned to carry out an updating exercise of the baseline survey for the Technical Textile Industry to estimate all information on the technical textile industry in India like market size, consumption, trade trends, number of units, type of units, type of products produced, investment, turnover, employment, etc.

In this regard MoT has appointed ICRA Management Consulting Services (IMaCS) to do a baseline survey of the technical textile industry of India.

## 2. IMaCS' Approach

Our approach towards comprehensively addressing all the aspects as spelt out in the Terms of Reference shall be structured under five (5) distinct modules, as pictorially represented in the exhibit below and subsequently explained in detail:

**Exhibit A-1: Summary of IMaCS Approach**



### **Module 1: Indian Technical Textile Market Analysis**

In this module, the Indian Technical Textile market is being mapped covering structure, products, trade, production, and market size by way of a market survey and trade analysis. This is being done under separate work streams as detailed below:

**Work stream 1: Product Identification:** A comprehensive list of Technical Textile products was prepared and HS codes are mapped for the identified list of Technical Textile products. This list forms the base for the import, export analysis and market sizing.

**Work stream-2. Trade Analysis:** For the identified Technical Textile products, the Indian trade data has been extracted from DGCIS, DGFT and any other reliable sources. The extracted data was analyzed to understand the following:

- Export volume and value across each product/segment
- Export trends for the last five years (2007-2012)
- Import volume and value across each product/segment
- Import trends for the last five years (2007-2012)
- Key export markets for India with market share
- Key countries where India is importing from and the market share

Based on this analysis, the trends in trade of technical textile products in India was established

**Work Stream 3-Manufacturing Analysis:** Based on the data collected from the primary survey, the manufacturing of Technical Textile products is being analysed on the following lines:

- Type of manufacturer - MSME/ Non-MSME
- Product wise manufacturing capacity, including roll goods and conversion
- Domestic consumption versus Exports
- Key manufacturing clusters

**Work Stream 4- End User Industry Trends:** The demand for Technical Textile products is derived demand and dependent on the growth of end user industries. As part of this analysis, we are studying the key end-user industries in India to understand the growth in these industries, trends in consumption of technical textile products by these end user industries and its impact on growth of Technical Textile manufacturing and trade.

**Work Stream 5- Market size Analysis:** Based on the analysis of imports, exports, manufacturing and end user industries, IMAcS has arrived at the market size across each segment of technical textiles. Market size as defined in the terms of reference will be the sum of indigenous production and imports.

The growth rate across each segment was analysed and based on the past trends, and end-user industry/macro economic trends the market size forecasting is being done for 3 years from 2013 to 2016. In addition to the market size, exports market growth, imports market growth, manufacturing growth forecast is being done for the next three years.

## **Module 2. Indian Technical Textile Industry Analysis**

Under this module, we analysed various dimensions of Indian Technical Textile Industry in terms of factor endowments and policy framework. We conducted this module under the following work streams:

### ***Work Stream 1-Factor Analysis***

The key factors driving the industry were analysed. It covered:

- Raw materials: Key raw materials used in Technical Textile Industry were identified and their availability and ease of access was analysed. We also mapped the composition of raw materials on the lines of domestic versus imports.
- Manpower: IMAcS assessed the availability of manpower to the Technical Textile industry which include managerial, technical, skilled and unskilled manpower .IMAcs would provide detail the employment status in Technical Textile Industry during the last three years and employment potential for the next three years will be projected, across, various segments which include SME, Non-SME, skilled, semi skilled and unskilled segments. We assessed Institutional support in developing the human resources for the industry.
- Technology: IMAcS assessed the technology across the industry.
- Support Facilities: The support available for the industry including Testing and Research & Development has been assessed
- Policy & regulatory framework: The Policy governing the industry and regulations, standards, which helps the industry growth was analysed.

### ***Work Stream 2-Location Analysis***

IMAcs did a detail state wise location advantages within India for setting up of Technical Textile manufacturing units, based multiple dimensions, which include, access to raw materials, institutional support, and the incentives offered by the government.

***Work Stream 3- Key Trends: Investment, Consumption, Production***

IMaCS studied the key trends in consumer usage of technical textiles to assess the impact on the overall market. Industry trends across various end-user segments will be studied which has an impact on the consumption of Technical Textiles. We studied recent investments in Technical textile industry in India to understand investment trends, both by Indian entrepreneurs and foreign investors. Profiles of major FDIs were developed. Case studies on investments through JV and collaborations by the Indian Technical Textile units have been prepared.

***Work Stream 4: Stakeholder Information***

Based on the primary survey done across all the units, exhaustive list of all the stakeholders in Technical Textiles is being compiled which includes manufacturers, traders (importers/ exporters), consultants, government bodies, user organisations (government/ private), technical textile machinery manufacturers, testing and research organizations, colleges, polytechnics, textile institutes, engineering institutions relevant to technical Textile Industry. Based on the information, IMaCS has prepared a directory covering name & address contact details, products produced/imported/exported, segment, capacity, turnover, SME/Non SME, Country of import/export.

Top 10 manufacturers in each segment of Technical Textiles in India will be further profiled. The profile includes structure and type of units i.e., SSI/non-SSI, 100% EOU, type of products produced, application areas of such products, installed capacity, type of machinery in the facility with break-up of imported and indigenous, capacity utilisation per year, domestic and export turnover, major raw material used with break-up of imported and indigenous, investment, profitability position, market share, turn over, no. of persons employed with breakup of technical, non-technical and contact details like telephone no., fax, e-mail, website & name of contact person etc.

***Work Stream 5-Sector Information***

A detailed report of special sectors including non-wovens, composites and speciality yarns is being prepared. Key information covered includes; current applications, market size across key applications, technology, and manufacturer distribution across geographies. The detail on strength and weakness of Indian Technical Textile Industry is also being assessed.

### **Module 3. Profiling Key Competing Countries**

In this module IMaCS assessed key countries where Technical Textile industry is thriving, which can provide direction for the Indian Technical Textile Industry. The assessment was done under three work streams to cover, industry structure, export performance, key success factors and key player profiles.

#### ***Work Stream 1-Industry Overview:***

Countries which are thrive across different Technical Textile segment were identified and industry/segment overview was detailed mentioning industry structure, availability of input materials, support infrastructure, key markets on best effort basis thorough secondary research.

#### ***Work Stream 2-Trade analysis:***

For the identified countries, international trade data was analyzed to arrive at

- Export volume and value across each product/segment
- Export trends for the last five years (2007-2012)
- Import volume and value across each product/segment
- Import trends for the last five years (2007-2012)
- Key export markets with market share

The trade data was compared with Indian exports to understand the position of Technical Textile exports from India.

#### ***Work Stream 3-Key Success factors***

Across each country key success factors were identified after analyzing various parameters including proximity to the end user market, R&D capability, institutional support, government incentives and regulatory framework, etc,.

#### ***Work Stream 4-Player Profiles***

Across each segment, key international players were identified and profiled. The profile include, turnover, capacity, growth, manpower, technology .The exercise was done through secondary research on best effort basis.

Based on the inputs received in this module, IMaCS did a comparative assessment of Technical Textile Industry with key countries where the industry is thriving.

#### **Module 4. Opportunities and challenges for Indian Technical Textile Industry**

Based on the strength and weaknesses of the Indian Technical Textile industry and comparative performance of the key countries, IMaCS identified opportunities and challenges for the industry.

##### ***Work Stream 1-Future Growth Potential***

The growth potential across each segment was assessed, based on the past trend, end-user industry trends, macro economic trends and the market size has been forecasted for next three years (2013-2016). In addition to the market size, exports market growth, manufacturing growth have been forecasted for the next three years. The inputs from industry players were considered towards projecting the growth in the manufacturing sector. The manpower requirement to meet the projected growth has been derived. The opportunities for creating employment and human resource development in the technical textile sector were highlighted.

##### ***Work Stream 2-Investments Required***

To meet the growth potential, investment required in manufacturing Technical Textile products and input materials was assessed.

The institutional support required for meeting, human resources, testing and R&D demand has been projected.

***Work Stream 3-Key Impediments:*** The key impediments for the growth of industry were analyzed, which may include, input materials, human resources, institutional support, government policies, fiscal duties, Inadequate Demand and Inadequate information/awareness.

#### **Module 5. Recommendations**

Further in discussions with the stakeholders the final recommendations will be arrive at which would include

##### ***Work Stream 1-High Potential Products***

Technical Textile products with high market potential will identified to assist existing and new players to invest in these segments. The drivers for the growth have also been detailed, which would includes both end-user industry and consumer demand.

### ***Work Stream 2- Government Policies & Regulatory Framework***

To meet the projected growth, government can play significant role, through awareness, incentivizing new investments, creating institutional support to the industry and export incentives. The institutional support in R&D, Human resources development can help industry to foster. Creation of standards and regulations can also push the consumption of the technical textile products creating further demand. Based on the industry inputs and growth projections, IMaCS will recommend key initiatives on which government may focus to meet the growth projections in the technical textile industry. The recommendations also include the human resource development through creation of institutions and courses/curriculum contents specific to Technical Textile industry.

## **Methodology**

We are carrying out this engagement through a mix of primary and secondary research.

### **Primary research**

***Baseline Survey:*** IMaCS has prepared a detailed questionnaire covering the details mentioned under stakeholder information part of TOR. Approval will be sought from OTXC on the questionnaire, which was used as the research instrument towards collecting information from the stakeholders.

The list of stakeholders was prepared using secondary resources and subsequently snowballing exercise was done during to survey to get additional referrals. The few secondary sources IMaCS referred to were:

- Stakeholders list from previous baseline survey
- Members list from ITTA
- TUFS Beneficiary list under Technical Textiles
- Stakeholders associated with COEs for availing their services
- B2B Trade websites such as Alibaba, global sources, fibre2fashion, etc.,

The data collected is being appropriately entered into excel format for analysis and cleaned.

***Interactions with COEs, associations, key industry players in the Technical Textile industry in India***

As a part of the exercise we are meeting the following stakeholders and interacted extensively with them. It involves visiting COEs/associations such as ITTA and CITI/ key industry players and also getting their responses through a structured questionnaire to understand Indian Technical Textile Industry, the effect of various scheme interventions, issues being faced, need for modifications in policy and regulatory framework.

**Secondary Research**

We are doing extensive secondary research and analysis for the engagement. For this purpose, we reviewed information available in the public domain – industry information from various associations of user industries, research reports of reliable agencies, databases and other reliable sources. We took data/information from the Office of Textile Commissioner regarding the database of stakeholders including TUFs beneficiary list under Technical Textiles.

### **3. Structure of report**

IMaCS has developed this report in four sections. In Part A, IMaCS has given details about the project background and its approach towards completion of the project. In the second section – Part B, an overview of the technical textile industry of India has been presented which includes details about the current market size, location advantages and the information about various investments in the technical textile domain. The third section – Part C involves detailed reports of each product considered as technical textiles segregated under the 12 technical textile segments. Each product has been analysed on the aspects of product characteristics, application, market size, major manufacturers, export and import scenario, key machineries required for the product manufacturing and the quality standards available for the product. The fourth part – Part D involves analysis of Indian technical textile industry on different factors of production involving raw material availability, different technologies used, policies and incentives available from both central and state governments for promotion technical textile industry. It analysis of work force available in the industry and prospects of skill development for technical textiles across India though various courses available. IMaCS has also done a comparison of Indian technical textile industry vis-à-vis other key global players of technical textile on various parameters under this section.

## **Part B. Overview of Technical Textiles in India**

## **1. Introduction**

Technical textiles are different from the conventional textiles. Unlike conventional textiles used traditionally for clothing or furnishing, technical textiles are used basically on account of their specific physical and functional properties and mostly by other user industries. Depending on the product characteristics, functional requirements and end-user applications the highly diversified range of technical textile products have been currently grouped into 12 categories based on application:

- Agrotech (Agriculture, horticulture and forestry)
- Buildtech (building and construction)
- Clothtech (technical components of shoes and clothing)
- Geotech (geotextiles, civil engineering)
- Hometech (components of furniture, household textiles and floor coverings)
- Indutech (filtration, cleaning and other industrial usage)
- Meditech (hygiene and medical)
- Mobiltech (automobiles, shipping, railways and aerospace)
- Oekotech (environmental protection)
- Packtech (packaging)
- Protech (personal and property protection)
- Sportech (sport and leisure)

The technical textile industry has immense potential in the developing countries. Asia is a power house of both production and consumption of technical textiles. China is the market leader in technical textiles. Korea, Japan, India and Taiwan are the other key players of technical textiles in Asia. Easy availability of labour along with availability of a wide range of fibre and fibre products in India is the key reason for the growth of technical textile sector in India.

### **Domestic Market of technical textiles**

Indian technical textile market is spread across all the 12 segments with Mobiltech, Packtech, Clothtech and hometech having the major share in the market. The domestic consumption has seen high growth of over 15% p.a in the segments of Mobiltech, geotech and indutech while the key segments of packtech, sportech, meditech and buildtech grew moderately at over 10% per annum. However, the demand for specialised technical textile products is still in a very nascent stage and is expected to be the driver in the future.

## 2. Market Summary

The technical textile market across the 12 key segments is as shown in the exhibit below:

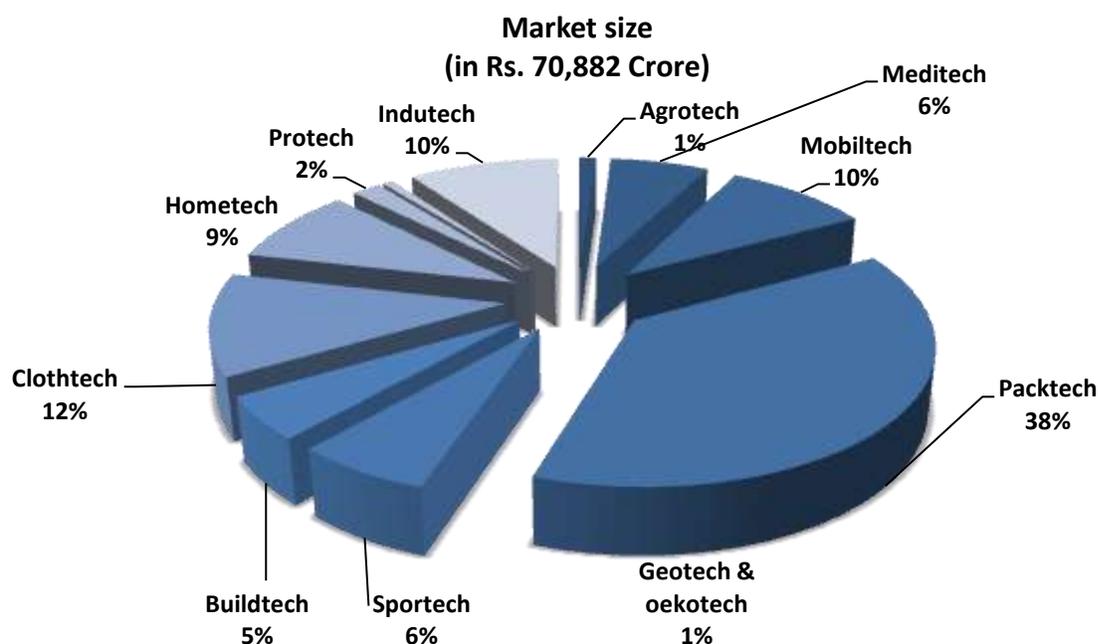
Exhibit B-1: Market summary of technical textiles

Sl. No.	Segment	Market size 2007-08 (in Rs. Crore)	Market size (Provisional) 2012-13 (in Rs. Crore)	Growth (2008- 13) CAGR
1	Agrotech	553	788	~ 7%
2	Meditech	1,669	4,591	~22%
3	Mobiltech	3,183	6,743	~16%
4	Packtech	14,630	26,995	~13%
5	Sportech	2,851	4,536	~10%
6	Buildtech	2,157	3,568	~11%
7	Clothtech	6,908	8,469	~ 4%
8	Homotech	5,025	6,304	~ 5%
9	Protech	1,302	1,340	~ 1%
10	Geotech & Oekotech	272	503	~13%
11	Indutech	3,206	7,045	~17%
	<b>Total technical textile market</b>	<b>38835</b>	<b>70,882</b>	<b>~11%</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

The share of different segments in the total market is as shown.

Exhibit B-2: Market size pie product wise



Source: IMaCS analysis

Segment wise market summary is as shown below:

### Agrotech

The total estimated market for the segment including the exports is as shown under.

Exhibit B-3: Market summary of Agrotech

Sl. No.	Product	Market size (P) 2012-13
1	Shade nets	108
2	Mulch Mats	14
3	Crop covers	2.07
4	Anti Hail & anti bird nets	10
5	Fishing nets	654
7	<b>Total</b>	<b>788</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMaCS analysis P=Provisional

### Meditech

The total estimated market for the segment including the exports is as shown under

Exhibit B-4: Market summary of Meditech

Sl. No.	Products	Market size (P) 2012-13(in Rs. Crore)
1	Baby Diapers	1,100
2	Baby Diaper (TT Component)	55
3	Incontinence Diapers	225
4	Incontinence Diaper (TT Component)	11
5	Sanitary Napkins	1,500
5	Sanitary Napkin ( TT Component)	63
6	Surgical Sutures	1,000
7	Surgical Dressings	1,796
8	Surgical Disposables(TT Component)	272
9	Contact Lenses	796
10	Wipes	101
11	Artificial Implants	497
	<b>Total Meditech market</b>	<b>4,591</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

P:Provisional

### Mobiltech

The total estimated market for the segment including the exports is as shown under

Exhibit B-5: Market summary of Mobiltech

Sl. No.	Product	Market size (P) 2012-13 (in Rs. Crore)
1	Nylon Tyre Cord	<b>3,299</b>
2	Seat belt webbing	<b>152</b>
3	Airbags (TT component)	<b>106</b>
4	Car body covers	<b>47</b>
5	Seat covers fabric/upholstery	<b>856</b>
6	Automotive interior carpets	<b>353</b>
7	Headliners (TT component)	<b>78</b>
8	Insulation felts	<b>612</b>
9	Sunvisors/sunblinds	<b>147</b>

Sl. No.	Product	Market size (P) 2012-13 (in Rs. Crore)
10	Helmets	1,015
11	Airlines disposable	-
12	Webbings for aircraft	-
13	Aircraft upholstery	77
14	TT usage in railways	1
	<b>Total Mobiltech Market</b>	<b>6,743</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

# still under verification – market size not finalised

P: Provisional

### Packtech

The total estimated market for the segment including the exports is as shown under

Exhibit B-6: Market summary of Packtech

Sl. No.	Product	Market size (P) 2012-13 (in Rs. Crore)
1	Polyolefin woven sacks (excluding FIBC)	9050
2	FIBC	3209
3	Leno bags	800
4	Wrapping fabric	2150
5	Jute hessian sacks (including food grade jute bags)	10750
6	Soft luggage (TT component)	494
7	Tea-bags filter paper	543
12	<b>Total Packtech Market</b>	<b>26995</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

P: Provisional

### Sportech

The total estimated market for the segment including the exports is as shown under

**Exhibit B-7: Market summary of Sportech**

Sl. No.	Product	Market size (P) 2012-13 (in Rs. Crore)
1	Sport Composites	755
2	Artificial grass	40
3	Parachute fabrics	100
4	Ballooning fabrics	1.5
5	Sail cloth	0.1
6	Sleeping bags	36
7	Sports Nets	55
8	Sport shoe components	3486
9	Tents	62
10	High performance swim wears and sports wears	1.5
12	<b>Total Sportech Market</b>	<b>4536</b>

*\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis*

*P: Provisional*

### **Buildtech**

The total estimated market for the segment including the exports is as shown under

**Exhibit B-8: Market summary of Buildtech**

Sl. No.	Products	Market size (P) 2012-13 (in Rs. Crore)
1	Architectural Membranes	22
2	Hoarding & signage	487
3	Canvas - tarpaulin	393
4	HDPE tarpaulin	1426
5	Awning & canopy	5.3
6	Scaffolding Net	10
7	Floor & Wall covering	1225
8	<b>Total Buildtech Market</b>	<b>3568</b>

*\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis*

*P: Provisional*

### Clothtech

The total estimated market for the segment including the exports is as shown under

Exhibit B-9: Market summary of Clothtech

Sl. No.	Product	Market size (P) 2012-13( in Rs. Crore)
1	Laces and tapes	537
2	Interlining	656
3	Zip fastener	264
4	Elastic narrow tape	804
5	Hook and loop fastener	187
6	Labels and Badges	1672
7	Umbrella cloth	103
8	Sewing thread	4246
9	<b>Total Clothtech market</b>	<b>8469</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

P: Provisional

### Hometech

The total estimated market for the segment including the exports is as shown under

Exhibit B-10: Market summary of Hometech

Sl. No.	Product	Market size (P) 2012-13 (in Rs. Crore)
1	Fibrefill	400
2	Ticking fabric	448
3	CBC(Carpet Backing Cloth)	220
4	Stuff toys	1084
5	Blinds	283
6	Filter fabric - HVAC & Vacuum cleaner	47
7	Non Woven Wipes for home	34
8	Mosquito Nets	471
9	Furniture Fabrics & other coated fabrics	3317

Sl. No.	Product	Market size (P) 2012-13 (in Rs. Crore)
<b>12</b>	<b>Total Hometech market</b>	<b>6304</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

P: Provisional

### Protech

The total estimated market for the segment including the exports is as shown under

**Exhibit B-11: Market summary of Protech**

Sl. No.	Products	Market size (P) 2012-13(in Rs. Crore)
<b>1</b>	Bullet Proof Jackets	186
<b>2</b>	FR Apparels	157
<b>3</b>	FR Fabrics	223
<b>4</b>	NBC	9.3
<b>5</b>	CPC	20.8
<b>6</b>	HVC	75
<b>7</b>	Industrial gloves	178
<b>8</b>	HAL	389
<b>9</b>	Other protective clothing	102.3
<b>10</b>	<b>Total Protech market</b>	<b>1340</b>

\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis

P: Provisional

### Geotech and Oekotech

The total estimated market for the segment including the exports is as shown under

**Exhibit B-12: Market summary of geotech**

Sl. No.	Product segments	Market size (P) 2012-13(in Rs. Crore)
<b>1</b>	Gabions	39
<b>2</b>	Geo - textile - woven	194
<b>3</b>	Geo - textile non woven	108
<b>4</b>	Other Geo - textiles - Geo Membranes/ PVDS, Geo bags, etc.	33
<b>5</b>	Geo-grids	87

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<b>Sl. No.</b>	<b>Product segments</b>	<b>Market size (P) 2012-13(in Rs. Crore)</b>
6	Total Geotech Production	461
7	Geo tech imports	42
8	Geo tech Exports	46
<b>9</b>	<b>Geo tech domestic market</b>	<b>457</b>
<b>10</b>	<b>Geo tech Total market</b>	<b>503</b>

*\*Source: Annual reports, websites, secondary reports, ITTA, IMAcS analysis*

*P: Provisional*

## **Indutech**

The total estimated market for the segment including the exports is as shown under

**Exhibit B-13: Market summary of Indutech**

<b>Sl. No.</b>	<b>Products</b>	<b>Market size (P) 2012-13(in Rs. Crore)</b>
<b>1</b>	Conveyor belts (TT component)	634
<b>2</b>	Drive belts(TT component)	174
<b>3</b>	Cigarette filter rods	423
<b>4</b>	Decatising cloth	41
<b>5</b>	Bolting cloth	32
<b>6</b>	AGM glass battery separators	228
<b>7</b>	Coated abrasives(TT component)	750
<b>8</b>	Ropes and cordages	2,327
<b>9</b>	Glass fabrics as a part of composites (TT component)	1,422
<b>10</b>	Printed circuit boards(TT component)	29
<b>11</b>	Computers printer ribbon	286
<b>12</b>	Filtration products	296
<b>13</b>	Paper making fabrics	214
<b>14</b>	Industrial brushes	188
	<b>Total Indutech market</b>	<b>7,045</b>

*\*Source: Annual reports, websites, secondary reports, ITTA, IMaCS analysis*

*P: Provisional*

### 3. Investment in Technical textiles

Technical textile industry has been a growing industry for the last five with many players going for new investments for product diversification and capacity additions. In addition to that, the growing preference for non woven fabric in technical textile has led to entry of new players in the segment particularly for catering to the home and hygiene markets using non woven wipes, diapers, anti bacterial textiles, etc. The key investments in technical textile sector during the last five years have been discussed below:

#### Key investments in Technical textile sector

The major investments in technical textile sector announced in the last five years have been shown in the exhibit below:

Exhibit B-14: Key investments in technical textile sector in last few years

Sl. No.	Year	Investing company	Sector	Details	Type of Investment
<b>Investment in Meditech</b>					
1	2012-13	CX Partner	Meditech	Purchased 40% stake in Sutures India for Rs. 200 Crore.	PE
2	2012-13	Global Non woven, US	Non woven & Meditech	New Spun melt line at Nasik of 20,000 MT capacity. It would target hygiene and medical applications	Capacity Addition
3	2012-13	Paramount Surgimed (India)	Meditech	Capacity addition for production of Adult diapers. It aims to expand its sales by 65%. Current capacity – 30 million per year	
<b>Investment in Packtech</b>					
4	2012-13	Alliance Polysacks	Packtech	Plans to double capacity from 63 million to 132 million sacks per year	Capacity Addition
<b>Investment in Mobiltech</b>					
5	2012-13	Caparo, UK	Composites – Mobiltech	Is setting up a unit for carbon fibre based composites for automobiles in South India	New Project
6	2012-13	Kaman Group & Kineco India	Composites - Mobiltech	New facility at Goa - called Kineco Kaman Composites India Pvt. Ltd. for production of advanced composites for airlines	Joint Venture via FDI
7	2012-13	Hollingsworth & Vose group	Automotive filters	Hollingsworth and Vose group is setting up a plant for manufacturing of automotive filters at Dahej worth Rs 1650 Crore <sup>1</sup>	Joint Venture
<b>Investment in Protech</b>					

<sup>1</sup> Investment is around USD 30 million – Exchange rate taken to be Rs. 55/ USD

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Sl. No.	Year	Investing company	Sector	Details	Type of Investment
8	2011-12	Shri Lakhmi Cotsyn Defence	Protech	Shri Lakhmi Cotsyn Defence, a major technical textile player located at Kanpur has made new investment to develop specific NBC fabrics and protective jackets for Indian defence sector. The capacity increase is currently underway	
<b>Investment in Indutech</b>					
9	2012-13	Freudenberg Filtration (India)	Indutech	Acquired Pyramid Filters Ltd.	Acquisition
10	2012-13	Hindustan Technical Fabrics & Toho Tenax Co. Ltd. , Japan	Composites - Indutech	Rights to develop and market carbon fibre fabrics in India	Strategic partnership
11	2012-13	SK Capital	Indutech and composites	Acquisition of Textile chemicals, Paper specialty and emulsion business of Clariant	PE via FDI
<b>Investment in Geotech</b>					
12	2012-13	Oerilikon Neumag	Geotech	Sold an inline plant with 12 spindles for geo-textile manufacturing	Subsidiary
<b>Investment in Non woven</b>					
13	2012-13	HB Fuller	Non woven	Capacity addition through new plant in Pune.	FDI
14	2012-13	Precot Meridian & VMI, Holland	Non woven & Meditech	Greenfield Non woven project in Karnataka for hygiene care products	Greenfield Project via JV
15	2012-13	Alpha Foam	Non woven	Capacity addition of Spun-bond non woven by 10,000 MTPA	Domestic Investment
16	2010-11	Ahlstorm	Non-woven	New Greenfield project at Mundra in Gujarat for production of non woven	FDI via subsidiary
<b>Strategic Partnerships</b>					
17	2011-12	Du-pont & Arvind Mills	Protech	Strategic alliance where Arvind acquired rights to manufacture and sell Nomex in India	Strategic Alliance
18	2012-13	Alok International & Richard and Kathy Hilton	Homotech	Alok acquired rights to manufacture and market home textile products under Hilton brand name.	Partnership

In addition to these major investments in the sector many domestic players have also expanded production capacity in the last five years. The major names for the same are:

### **FDI in technical textiles**

Indian textile sector has grown mostly on account of domestic investment. The FDI in textiles sector of India is less than 1% of the total FDI inflow into India for last five years. The trend in FDI for textile sector is shown in the exhibit below:

Exhibit B-15: FDI in textile sector



Source: Ministry of Textiles

Technical textile sector is a major driver for FDI as it is in a growing phase in India and the market is expanding rapidly for segments like protech, geotech, meditech, packtech as the awareness and preference of technical textile is growing. Major FDI projects in technical textile sector for the last five years are enumerated as under:

- Ahlstrom invested through its Indian Subsidiary Ahlstrom (India) Pvt. Ltd. for production of non woven in Mudra Gujarat. The project became operational in 2010-11.
- Global Non woven is planning a new spun melt line at its Nasik plant in India for production of non-woven
- Caparo, an industrial composite maker based out of UK has invested to develop a new plant for plastic composites in South India to cater to automobile manufacturers.
- Hollingsworth and Vose group, based out of US are investing Rs. 1650 crore in Indian technical textile industry for starting a automotive filter plant at Dahej in Gujarat.
- Oerilikon Neumag, a global player for geo-textiles is planning to enter Indian markets. It has already invested for development of 12 spindles to produce 10,000 MT of geo-textiles in South India.

## **4. Location analysis**

The technical textile industry in India is concentrated in few key pockets across the country. While Gujarat is the hub for categories like homotech, packtech, agrotech and non wovens, Maharashtra is the hub for most of clothtech and indutech production. The key states where technical textile industry is clustered along with their relative advantages have been discussed as under:

### **Gujarat**

Gujarat is the hub of technical textiles with many key players located in Ahmedabad and Surat, the two strong holds with over 300 units involved in textiles and technical textile at each location. Gujarat is the market leader amongst Indian states in production of manmade textile based packtech and clothtech products and non woven.

The state has the distinct advantage of a easy and cheap supply of raw material both cotton as well as manmade fibres, both of which are manufactured in large quantities in Gujarat. In addition to that, the textile policy of Gujarat offers upto 6% credit linked interest subsidy for promotion of technical textile industry. This along with the stream lined support from the State government in terms of easy availability of licenses goods infrastructure support in terms of power and road connectivity have been the major booster for technical textile industry in the state. As a result many new projects have entered in the state like Ahlstrom's Non-woven plant and Hollingsworth and Vose group's auto filter plant which would be set up at Dahej in Gujarat. Gujarat also enjoys the availability of skilled man power which has been trained over generations working on the textile industry as well as goods research and development support with ATIRA and MANTRA located in the state.

### **Maharashtra**

Maharashtra is the other important state when it comes to technical textiles. The State excels in various indutech and home tech products with key players located in and around the Mumbai – Pune area. Large players like Spica Elastic, Garware ropes, Bombay Dyeing, Entremonde Polycoaters, Sky industries, Supreme Non woven and Kusumgar corporate are some of the renowned names of technical textile industry that are located in Maharashtra.

The state has the largest area under cotton cultivation and enjoys goods supply of raw material as Mumbai is the major economic hub for the Nation. It is closely linked to the raw material supplying industries of Gujarat also. The state has one of the finest technical textile institutes in India with four

COEs being located in Maharashtra. However, the textile policy of the state does not put high emphasis on the technical textile industry.

### **Tamil Nadu**

Tamil Nadu is a major textile hub of the country. Over the years it has also made its mark in the technical textile industry with many key players of clothtech and hometech located within the state. The State has a large number of SMEs that are involved in supporting the garmenting industry of the state by supplying key technical textile raw materials. Key technical textile industries located in the state are Precot Meridian, Loyal Textiles, Zip industries, Ideal zippers, MRF and Fruedenberg non woven. In addition to this the state has a cluster of mosquito net manufacturers located at Karur. Both the Association of Fishnet manufacturers and Mosquito net manufacturers are located in Tamil Nadu.

The state has the largest number of spindles in the country and is a major fabric producer. It provides support to the technical textile industry by providing an easily approachable market of textiles and garments. As a result the clothtech industry is flourishing in the state. It also has goods supply of cotton. However, the state lacks in providing incentives for promotion of technical textile industry.

### **Karnataka**

Karnataka is another major hub of technical textiles with over 72 technical textile industries located in the state mostly around Bangalore. The key industries are Kurlon India, Madura Coats, Tata Adanced Materials and Futura Surgicare. The state is a major hub of meditech.

Along with the key industries, the state also enjoys the benefit of having goods infrastructure and appropriate location between, Andhra Pradesh, Tamil Nadu and Maharashtra which are the major fibre and fabric manufacturing states. The state has come up with a new textile policy with special focus on technical textiles by providing an addition 10% capital subsidy for technical textile industries, thereby promoting companies to set up in the State. The State plans to spend Rs. 1,700 crore in the XII<sup>th</sup> plan for development of technical textile industry in the state. This would act as a major booster for technical textile industry in the state.

### **Delhi/ NCR**

Delhi NCR is a major hub of technical textiles with many key industries with operations across different segments of technical textile located in the National Capital region. The region has goods concentration of Mobiltech, sportech and hometech players. The key technical textile industries in the region are Uniproducts Ltd, Abhishek Auto industries, YKK Pvt. Ltd., Alps Industries, Sheela Foams, Flocksur India,

Jasch Group and RSWM Ltd. The region enjoys the benefit of being the major industrial as well as business centre of Northern India well connected with goods infrastructure to promote industries.

### **Other major clusters**

Other than the above mentioned key states, there are a few clusters of technical textile production. These have been discussed as under:

***Kolkata:*** Kolkata is a major production of jute based technical textiles in particular hessians and protective technical textiles like industrial gloves and industrial work wears. The city has most of the industrial gloves manufacturers present in India. The key technical textile industry located at Kolkata are Chev Jute, Gloster jute mills and Bali jute mills in the Packtech segment and Mallcom India Ltd, Rajda exports, Tara Lohia, Intech Safety and Jayashree Textiles in the Protech segment. The cluster enjoys the benefit of easy availability of goods quality jute which is produced in West Bengal as well as the skill set in developing protective textiles like industrial gloves, which has been acquired with years of business.

***Kanpur:*** Kanpur is the major hub for production of tents, tarpaulins and sleeping bags. The city has many small SMEs like Tirupati Taxco and Kanpur tent factory as well as large technical textile players like Shri Lakshmi Cotsyn, M Kumar Udyog, Ganesha Ecosphere Ltd. and Standard Newar Mills. The city also has production facilities of ordinance boards that are involved in development of technical textile products.

Although Kanpur has no distinct advantage in terms of easy supply of raw material or excellent power and road infrastructure, the city a major industrial hub of Uttar Pradesh has work force that is skilled in these lines with ages of experience in the industry and is available at cheaper rates.

***Meerut & Jalandhar:*** Meerut and Jalandhar are both major clusters and production hubs of sport composites. While Meerut excels in manufacturing of cricket and boxing based sport composites Jalandhar excels in manufacturing of inflatable balls. The major players at Meerut are S S industries, S G Pvt. Ltd., K L Mahajan group and Bhatia Sports. The major industries around Jalandhar are Soccer International at Jalandhar and Freewill Sports at Ludhiana. The clusters enjoy the advantage of having a cheaper work force.

## **Part C. Segment wise Information on Technical Textiles in India**

## 1. Agrotech

Agrotech includes technical textile products used in agriculture, horticulture (incl. Floriculture), fisheries, animal husbandry and forestry.

### List of Products

The key technical textile products under the segment are as under:

- Shade-nets
- Mulch-mats
- Crop-covers
- Anti-hail nets and bird protection nets
- Fishing nets

### Market size and trends

The total estimated market size of Agrotech is estimated to be Rs. 788 Crore. Close to 98% of the entire market is catered by domestic supply. The market is driven by domestic consumption with exports market contributing 23% to the total market, with a major product being exported is fishing net. Product wise market size estimate has been shown in the exhibit below.

Exhibit C-1: Market size estimation

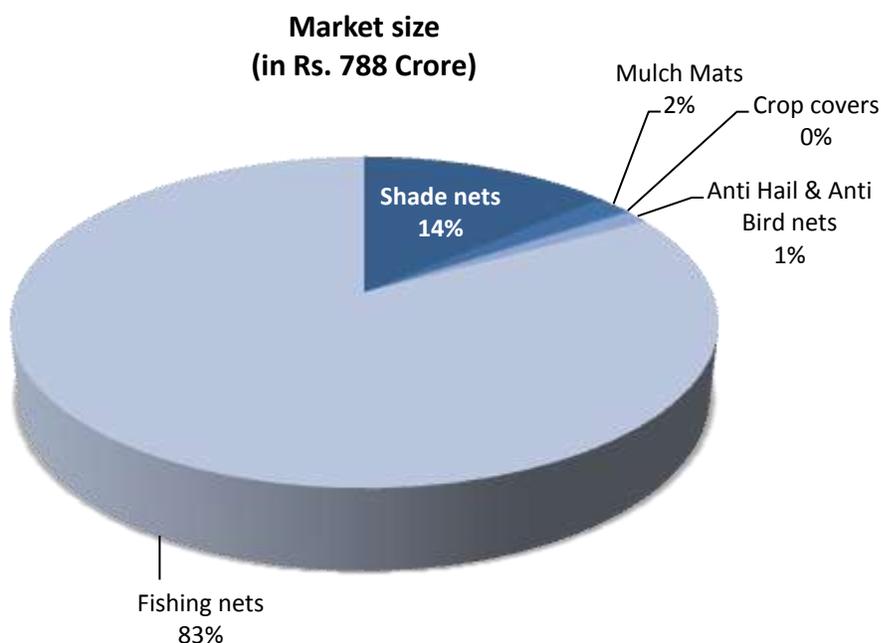
Product	2012-13 (figures in Rs. Crore)				
	Production	Import	Export	Domestic Consumption	Total Market size
Shade nets	108	0	11	97	108
Mulch Mats	14	0	0	14	14
Crop covers	2.07	0	2.07	0	2.07
Anti Hail & anti bird nets	10	0.03	0.1	10	10
Fishing nets	638	16	170	484	654
<b>Total</b>	<b>772</b>	<b>16</b>	<b>183</b>	<b>605</b>	<b>788</b>

Source: IMaCS analysis

\*Total market size is calculated as exports + domestic market

Fishing net is the largest product in the segment having 83% share in the market size of the segment. Shade-net is the other key product of the segment. Rest of the products have relatively much smaller share of less than 2% of the market. The product wise market share is as shown in the exhibit below.

Exhibit C-2: Market size pie product wise



Source: IMaCS analysis

### **Key players**

Key players manufacturing sports technical textiles in India are as under:

- Garware Wall Ropes Ltd.
- Rishi TechTex Ltd.
- Netlon India Ltd.
- Neo Corp Ltd.
- CTM Agro textiles Ltd.
- Safeflux Pvt. Ltd.
- B & V Agro and Irrigation Co. Pvt. Ltd.

The detailed analysis of each product of the segment is done in the subsequent sections.

## Shade Nets

Shade nets have widespread applications in floriculture (roses, orchids, etc), horticulture (Cabbage, pepper, Grapes etc), vanilla cultivation, tea plantations, drying of agri-products, cattle-sheds, parking lots, swimming pools, etc. The shade nets provide protection to the plants from wind, extreme weather conditions and reduce water evaporation.

India with more than 32 MT of fruits and 66 MT of vegetables is the second largest producer of fruits and vegetables. India is the second largest producer of flowers after China with about 1,15,921 hectares of area under floriculture. India has adopted some of the newer techniques for agriculture, but modern techniques involving the use of polymers are still lagging behind. In comparison, China's agricultural sector uses modern techniques and consumes products like shade nets extensively. Hence, the potential of the shade-nets market in India is huge, in comparison with its existing usage.

### *Product characteristics*

Shade nets are generally made of Polypropylene or HDPE in knitted or woven form. Shade-nets are tough, durable, tear resistant and light weight. The standard sizes of nets available are 2, 3, 4 & 8 metres in width and 25, 50 and 100 metres in length. The most common dimensions of these nets are 3 m (width) by 50 m (length) with GSM of 120 to 180. The shade nets are generally Green or Black in colour. The shade percentage, which indicates the degree of shade provided by the shade-nets, varies from 25 percent to 90 percent. The shade percentage depends upon the application / plants under cultivation.

Exhibit C-3: Usage pattern of shade net

Type of Crop	Recommended shading by manufacturers
Roses, Strawberries, Gooseberries, Tomatoes, Cucumber and fruit bearing plant	25%
general Pot and foliage plants and Cut greens, Orchids, Anthuriums, Ginger,	50%
Indoor plants, certain Orchids, plantation crops, Tea, Coffee, Cardamom	75%
Cattle sheds, Poultry houses, and vehicular shades	95%

Source: Industry survey

### *Key application areas of shade-nets*

The key application areas of shade nets are:

- Agricultural applications - grape cultivation, orchid plantations, tea plantations, nurseries

- Non-agricultural applications – swimming pool coverage, parking lots, etc

The demand for shade nets largely depends upon the usage in floriculture and horticulture. The increasing awareness of the benefits of using shade nets and assistance from schemes of National Horticulture Mission (NHM) are making a significant impact on the demand.

The demand for shade nets for grapes cultivation is slowing down as farmers are increasingly using paper instead of shade nets. The papers help to protect the plants from cold climate apart from providing the functionality of shading. However, the inspection of plants for any disease becomes difficult in case of paper usage.

The tea garden nurseries hold a lot of potential for shade-nets. The shade nets usage in the tea gardens nurseries is derived from the number of tea gardens going for re-plantation. Since the re-plantation of tea gardens is fairly minimal in India, shade nets usage is not significant in tea gardens.

The demand for shade nets is also increasing in non-agricultural applications like parking lots, garden fences, etc.

#### ***National Horticulture Mission subsidy norms***

National Horticulture Mission (NHM) provides subsidy to farmers for using shade net up to an extent of Rs. 600 per sq ft limited to a maximum of 50% of the cost and for a maximum land area of 1000 sq. ft area.

#### **Market size and trade trends**

Subsidy under National Horticulture Mission (NHM) is the biggest driver for the market of shade nets. Currently NHM is offering a subsidy of up to 50% of the cost of shade nets limited to a maximum of 2 hectare per beneficiary. The usage of shade nets through NHM accounts for close to 80% of the usage of shade nets in India. This figure has been continuously growing at over 20%. In 2012-13 as per NHM reports, a total of 1415 Hectares of area was cultivated under shade-nets in India as against a target of 1322 hectares, indicating that more and more farmers are now opting for shade nets.

#### ***Market size estimate***

The domestic market for shade nets in India is estimated to be of 4,548 MT amounting to Rs. 97 Crore priced at an average of Rs. 30 per sq metre of area. In addition to this India has been exporting shade nets to a tune of about 520 MT amounting to Rs. 11 Crore in 2012-13. The total market size of shade nets has been shown in the table as under:

**Exhibit C-4: Market size estimate**

	2012-13
<b>Quantity (in MT)</b>	5,068
<b>Value (in Rs. Crore)</b>	108

*\*source: IMAcS analysis, industry sources, NHM reports 2012-13*

The market has grown by 30% over last 5 years. The domestic market has been key driver for the industry growing at 36% while the exports have declined during the last five years. The total area for use of shade nets has also increased as compared to what it was in 2007-08.

***Key growth drivers and Inhibitors***

The market would mainly be driven by purchases via National Horticulture Mission subsidies. The focus of the NHB on development of horticultural crops in India has been a major driver for the industry and would continue to grow the industry. However, the lack of awareness about the benefits of shade-nets in most of the rural regions of Uttar Pradesh, Bihar, Maharashtra, Andhra Pradesh and interior Maharashtra which are major cultivators of horticulture crops, vegetables and cash crops in India, has acted as a major hindrance in wide spread acceptability of the product. The market of shade nets sees high potential growth with more farmers opting for commercial farming and growth of large plantations. It is expected to grow at 15% per annum during the coming years.

***Key Manufacturers***

Shade nets are mostly manufactured by netting manufacturers in India. As shade net in itself is not a very big business in India, many players are also in to production of other net products like hail nets, fishing net and sports nets. Key manufacturers of shade nets are:

- Neo Corp India Limited
- Netlon India Limited
- Garware Wall Ropes Limited
- Rishi Techtex Limited

***Import export scenario***

India is a net exporter of shade nets with exports of Rs. 11.14 Crore. In 2012-13, majority of export of shade net was done under the HS code 39269099. Other key HS codes for export were 39262099, 58061800, 6059000 and 94060011. The growing demand of shade nets in India which has grown by 30% each year over the last 5 years has been a major factor for declining exports. On the other hand, an

import of shade net is negligible at just Rs. 8 lakh in 2012-13. The details of HS codes under which the exports have been done can be seen as under:

Exhibit C-5: Export of shade nets from India

HS Code family	HS code description	HS codes	Export Value(E) (2012-13) (in Rs. Crore)
<b>3926</b>	Articles of Polypropylene, plastic, N.E.S	39269099	Rs. 11.1 Crore
<b>5608</b>	Made up nettings of nylon	56081110	
	Other knotted netting of twine, cordage or rope of man-made textile materials	56081900	
<b>9406</b>	Green houses- in ready to assemble sets	94060011	

\*source: IMAcS analysis, , DGCIIS, DGFT

### Machinery details

Existing HDPE Woven sack processors can manufacture HDPE Agri-shade nets on the same tape extruder with an additional investment in knitting machines. Thus increasing the product mix leading to higher capacity utilization of the machinery would bring in a higher net profitability.

The raschel knitting machines used for manufacturing shade-nets are mostly imported. GCL India Pvt. Ltd (Bangalore) is one of the local manufacturers of raschel knitting machines. The key raschel knitting machinery manufacturers in the world are Karl Mayer (Germany), LIBA Maschinenfabrik GmbH (Germany) and Brückner Technology Holding GmbH (Germany).

The Indian associates / suppliers for these machinery manufacturers are:

- ATE engineering (Bombay) for Karl Mayer
- Brückner Machinery and Service India Pvt. Ltd (Pune) for Bruckner.

### Quality Standards

Different standards for shade nets as per BIS are:

- IS 16008:2012 – It defines specification of shade nets for horticulture and agricultural purposes for different shadings of the net – 50% and 75%.

## Mulch Mats

Mulching is defined as covering of soil around the plants to conserve soil moisture, prevent weeds and modify soil temperature. It is an effective practice to restrict weed growth, conserve moisture and reduce the effect of soil borne diseases through soil solarisation. Black film prevents the germination and growth of weed seeds in contrast to clear film. It absorbs more sun energy and retains higher heat underneath the film. Mulching has been helpful in not only preventing moisture loss through evaporation from the soil and lowering the temperature but also reducing nutrient loss by leaching and weeds control where chemical fertilizers and weedicides are used. Mulching also reduces run-off, increase penetration of rainwater, controls erosion, corrects the chemical balance of the soil and reduces damage done by pests and diseases. Apart from these major results mulching produces secondary effects such as improvement of soil structure, increase in micro-activity, earthworm populations and root systems that are more extensive.

In India, straw, hay, sawdust, asphalt paper, etc is traditionally used for mulching. Use of technical textiles for mulching is yet to gain momentum.

Mulch mats keep ripening fruits, off the soil. The reduced contact with the soil decreases fruit rot as well as keeps the fruit and vegetables clean. This is beneficial for the production of several fruits including strawberries. Before plantations of the seedlings, the beds of the field are covered with the mulch mats (generally a black opaque film) and the holes are made at the desired spots where in the seeds are planted. The use of mulch mats along with the use of drip irrigation can lead to significant increase in productivity. But, the non-biodegradable mulches must be removed from the field and disposed of properly.

### *Product characteristics*

Mulch mats are made of both natural (wool and jute) and man-made fibres (LLDPE, HDPE). Mulch mats can be classified as:-

- Woven
- Non-woven
- Mulch-films

Wool fibre is used for designing **Non-woven Mulch mat**, LLDPE polymer is used for **Mulch films** (Extruded sheets in various thicknesses, microns) and fibres like jute and cotton are used for **Woven mulch mats**.

Mulch mats made of biodegradable material are incorporated into the soil as fertiliser for the next crop. Wool mulch mats allow water to enter in to the soil (unlike black sheet) and act as a barrier to prevent excessive soil desiccation during dry period. It also provides better insulation and prevents damage from ground frost. On the other hand, HDPE/LLDPE mulch films are cheaper and last for one to four years. Mulch films made of LLDPE are most commonly used for mulching in India.

### ***National Horticulture Mission subsidy norms***

NHM gives subsidy at the rate of Rs. 20,000 per hectare for cultivation using mulch mats limited to a maximum of 50% of the cost and 2 hectare of area per beneficiary

### **Market size and trade trends**

Mulch mats are used for protection of low lying cash crops and exotic horticultural crops like strawberries, water melons, and low height flowers. The use of mulch mats in India is promoted through NHM via its 50% subsidy for installation of mulch mats. In 2012-13 a total of about 15,400 hectares of area was cultivated using mulch mats in India through benefits from NHM. However, due to the shorter life of mulch mats which generally lasts two crop cycles, the replacement market for mulch mats is very high. The average rate of replacement of mulch mats is close to 2 years in India. Based on the data from NHM reports, the total replacement of mulch mats occurring in 2012-13 is close to 15000 hectares for plantations under NHM.

Due to the high value of exotic horticultural crops cultivated under mulch mats and the low cost of mulch mats, many farmers and plantations purchase mulch mats through open market instead of through NHM. As a result the share of NHM sales in total mulch mats is limited to just about 40% of the entire market.

### ***Market size estimate***

The total market for Mulch films in India is estimated to be 3462 MT worth Rs. 72 crore. However, a majority of it is constituted by plastic mulch films which are a cheaper substitute of the woven or non woven fabric mulch mats. Out of the total market of mulch films, the market of woven and non woven mulch mats is estimated to be of 692 MT worth Rs. 14 crore. As there is insignificant import and export of mulch mats from India, the market potential is mostly dependent on domestic consumption. The table below shows the market size estimate for Mulch mats in 2012-13

**Exhibit C-6: Market size estimate**

	<b>2012-13</b>
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	Total mulch film – Plastic & non woven/woven	Nonwoven/ woven mulch mats
Quantity (in MT)	4632	692
Value (in Rs. Crore)	72	14

\*source: IMAcS analysis, industry sources

### **Key growth drivers and Inhibitors**

The increase in cultivation of high value crops - vegetables, exotic fruits like strawberries, pine-apples, cash crops like ground nuts and flowers has been the key for the growth in use of mulch mats. While many farmers purchase it via NHM, due to its cheaper cost and high margins in the crops it is used for, many farmers have now started to purchase mulch mats from open markets. This has led to far more sales than estimated via NHM, as more and more farmers are opting for it seeing the benefits. Deeper penetration in awareness of the product across the country and increasing preference for vegetables and fruits as compared to staple crops are the key factors for the growth of mulch mats in India. The entire demand of mulch mats is met via domestic supply with negligible exports and imports. The market for mulch mats is expected to increase at 16% per annum. However, the growth in market of woven and non woven mulch mats would be lesser at 12% per annum.

### **Key Manufacturers**

Some of the major manufacturers of mulch mats are Fiberweb India, Shivam Polymers, Climax Synthetics Pvt. Ltd, Creative polymers Pvt. Ltd and Essen Multipack Ltd. Many of these players are located in Gujarat. Most of the manufacturers of mulch mats are small-scale industries.

### **Import export scenario**

Foreign trade of mulch mats from India has been. The details of HS codes under which the exports have been done can be seen as under:

Exhibit C-7: Export of shade nets from India

HS Code family	HS codes	HS code description
<b>3926</b>	39269080	Polypropylene articles, n.e.s.
	39269099	Other articles of plastic nes
<b>5603 &amp; 5608</b>	56031200	Coated, covered or laminated non-woven made from manmade filament with weight more than 25 g/ SQM
	56089090	Other twines , cordages and ropes

\*source: IMAcS analysis, , DGCI, DGFT

### **Machinery details**

Monolayer Blown Film Lines as well as Multilayer Blown Film Lines are used for the manufacture of mulch films. Monolayer lines give higher specific output per screw RPM. They have grooved feed technology for forward movement of the raw material and candle type screen changer to ensure wastage control and long production runs.

The machinery required is available locally and there are number of manufacturers for the same. The major Indian manufacturer of these lines is Kabra Extrusion Technik Ltd (KET). A Plastic Mulch Laying Machine was also developed at CIAE, Bhopal.

### **Quality Standards**

The Mulch Films (HDPE & LDPE) are covered under IS 10889:2004, IS 2508:1984 and the new section of IS 16190:2014.

## **Crop covers**

Crop-covers create an excellent microenvironment for seed germination and seedling growth. A crop-cover is placed over a large area (several rows) of a crop. In cooler climates, crop-covers are often placed over direct seeded rows or recently transplanted crops to create a warmer, more humid microenvironment to facilitate rapid plant establishment of warm season crops. Crop covers also provide crop protection from insects.

Advantages of using crop covers:

- Higher soil and air temperatures compared to those in the open field which leads to early harvest
- Protect crops from rain, hail, snow and wind
- Providing protection against insect pests
- Improvements in seed bed conditions
- Crop covers can also be used as a means to separate varieties to maintain line purity by excluding insects and thus preventing cross pollination
- Higher yields and improved crop quality

### ***Product Characteristics***

The crop covers can be classified as:-

- Woven
- Non Woven
- Sheet / Film

The light weight and the permeability of these covers allow gas exchange and penetration of rain, controls insects, enhances growth and freeze protection and eliminates hand ventilation. Although non-woven materials are more expensive, they do not burn or chaff crops as readily by allowing some penetration of water and lowering the maximum temperatures beneath the cover.

The non-woven crop covers are UV Treated fabrics of polypropylene manufactured using the spun bond technique. The crop covers are light in weight (generally 17-19 grams per square metre) so that the plants are not crushed under their weight. Generally 17 to 19 GSM UV treated white fabric is used in hot climate and 20 to 30 GSM in cold climates to protect the crops from frost. The non woven fabrics are packed in the form of rolls of 3 metre width and length of 450-500 metres.

In addition, woven crop-covers are also used around the world. The simplest and most economical form of crop covers are the direct or floating covers with no sustaining wire or cane hoops.

### ***Key Applications***

Key application of crop covers is in promoting faster and better growth of seedlings by providing a nurturing micro-environment of warmth. Usage of crop covers in India is very low. Due to lack any promotional policies like the ones for shade nets and mulch mats, the purchase of crop covers in India is very low. However, the product finds application in nurseries, cultivation of exotic cash crops and horticultural crops.

### **Market size and trade trends**

The domestic market size of crop-covers in India is insignificant limited to less than a Crore, as per insights from the industry. Presence of cheaper and easily available plastic tunnels as a substitute for crop covers further prevents the growth of crop cover industry in India. In presence of steep competition from plastic tunnels and the lack of any incentive from NHM or Government of India for use of crop covers, the market is expected to grow at just around 4% in the coming years. Exports of crop covers in 2012-13 was ~Rs. 2 Crore.

### ***Import export scenario***

The export of crop covers from India is about Rs. 2 Crore equivalent to 147 MT. No imports were recorded in 2012-13. The details of HS codes under which the exports have been done can be seen as under:

**Exhibit C-8: Export of crop covers from India**

<b>HS Code family</b>	<b>HS code description</b>	<b>HS codes</b>	<b>Export Value(E) (2012-13) (in Rs. Crore)</b>
<b>5603</b>	Coated, covered or laminated non-woven made from manmade filament with weight less than 25 g/ SQM	56031100	Rs. 2.07 Crore
	Coated, covered or laminated non-woven made from manmade filament with weight between 70 to 150 G/ SQM	56031300	
<b>9406</b>	Green houses in ready to assemble sets	94060011	

*\*source: IMAcS analysis, , DGCIIS, DGFT*

### **Machinery details**

Most of the machinery used is imported from Germany, China and Taiwan.

For spun-bond non-woven manufacture, the commonly used production line is Reicofil double beam production line manufactured by Reifenhauser GmbH of Troisdorf, Germany. Several Indian players have imported Chinese machinery (e.g. single beam PP spun-bond line from Shaoyang, China) at a much cheaper price.

### **Quality Standards**

There are no Indian standards available in BIS for crop covers. However the BIS does have a common standard for all ground covers for agriculture and horticulture activities – IS 16190:2014.

## Anti Hail nets / Anti bird nets

### Anti Bird nets

Bird protection nets are used for protection of fruits and crops from birds. Bird protection net is a mesh product designed to exclude the birds and therefore stop the expensive losses they can inflict on your crop. With an optimal holes size, it is large enough to allow movement of bees and keeps shade to a minimum. It does not prevent light from reaching the plants below and so flourish

### Anti Hail nets

Anti hail nets are used in to protect fruit trees and fruit crops like apples, strawberries, litchi mostly in high altitude areas which are prone to frequent hail storms like Jammu and Kashmir, Uttaranchal, Himachal Pradesh and the North Eastern States. These are either monofilament yarn woven together to form a mesh or knitted mesh of tapes.

### *Product Characteristics*

#### **Anti Bird nets**

Bird protection net is a mesh product designed to exclude the birds and therefore stop the expensive losses they can inflict on your crop. It has large size holes so as to prevent birds, but at the same time not to hinder the light and air from reaching the plants. These nets are manufactured from Polypropylene or HDPE Monofilament yarn (UV stabilised) and knitted into a durable ultra light mesh fabric of 25 to 40 GSM. The key characteristics of bird nets are durability, light weight and tear resistance. The standard sizes of nets available are 1, 2, 3 & 6 metres in width and 10, 20, 50 and 100 metres in length. These nets are generally Green, Blue or White in colour. The shade percentage, which indicates the degree of shade provided by the nets, is around 20 percent.

#### **Anti Hail nets**

Anti-hail nets are used to prevent hail damage in a broad variety of crops. These are woven from HDPE yarn or are combination of HDPE monofilament and tape in knitted form, stabilised against UV rays. These nets are transparent in colour with hole size of 2\*100 mm to allow the crops to receive a low level of shade (13% to 30%). The GSM of these nets varies from 60 to 100. These nets are flexible, light, strong and easy to spread, and can be placed on simple support structures.

### ***Norms of Assistance for programmes under National Horticulture Mission***

As per National Horticulture Mission, support in the form of assistance from the Govt. of up to 50% of the cost of anti-hail nets/ anti bird nets at the rate of Rs. 20/- per sq. metre of area, subjected to a maximum of 5,000 sq. metres per beneficiary is being provided for promotion of use of anti hail and anti bird nets.

### **Market size and trade trends**

The market for Anti hail nets and anti bird nets in India is mostly for protection of fruit bearing plants and trees. Close to 80% of the purchase of anti hail nets occur through NHM while the open sales account for the other 20%. The average requirement of hail net per tree is estimated to be 64 sq. metres. In 2012-13, a total of 301 hectares of area was brought under the use of hail nets and bird nets. With an average life of 7 years, the replacement market for these nets is estimated to be 20% of total demand for Anti hail and anti bird nets. It is estimated that the majority of demand is for anti hail nets which accounts for close to 85% to 90% of the demand, while bird nets have just about 10% to 15% of the total demand.

### ***Market size estimate***

The domestic market for anti hail nets and anti bird nets is estimated to be 395 MT covering a total of 376 hectares of area. The market has grown at 25% per annum over the last five years is estimated to be Rs. 10 Crore. The entire demand is met through production in India as both imports as well as exports of ant are insignificant. The table below shows the estimated market size of anti hail and anti bird nets for 2012-13.

**Exhibit C-9: Market size estimate**

	<b>2012-13</b>
<b>Quantity (in MT)</b>	395
<b>Value (in Rs. Crore)</b>	10

*\*source: IMaCS analysis, industry sources*

The domestic has grown at 25% during the last five years. The growth in sales volume which has risen by 31% has been the major factor behind the increase in market size. It is estimated that close to 75,000 trees in India are being protected by anti hail/ bird nets. This has been a major growth factor for the market, growing from a coverage of 50,000 trees in 2007-08.

### **Key growth drivers and Inhibitors**

The increasing awareness and the subsidy provided by NHM for use of anti hail nets has been the major driver for the industry. Close to 80% of the market is driven by sales through NHM. With the government targeting a growth rate of 6% for fruits during the XII<sup>th</sup> plan period as compared to 5.5% in the XI<sup>th</sup> plan, the market for anti bird and anti hail nets is poised to grow at higher rates. The total area under fruits for 2012-13 is 6873 hectares of which close to 4500 hectares is under cultivation of fruits that are grown on trees. Currently the market of anti hail nets and anti bird nets is just about 9% of the total area under fruit trees. This indicates that there is still a modest opportunity to grow and the market is expected to grow at 8% in the coming five years.

### **Key Manufacturers**

The major manufacturers of anti bird and anti hail nets in India are:

- Netlon India Limited
- Garware wall ropes Ltd.
- Kwaliti Nets Manufacturing Co. Pvt. Ltd.
- B & V agro and Irrigation Ltd.

### **Import and Export**

Import of Anti hail and anti bird nets into India is very small of just around Rs. 13 lakh. Export of these nets from India is also insignificant to the tune of Rs. 3 lakh. The details of HS codes under which the exports have been done can be seen as under:

**Exhibit C-10: Export of anti hail & anti bird nets from India**

HS family	Code	HS code description	HS codes	(2012-13)
<b>Import</b>				
<b>3926</b>		Other hangers	39269069	Rs. 3 Lakh
		Other article of plastic nes	39269099	
<b>5608</b>		Made up nettings of nylon	56081110	
		Other knotted netting of twine, cordage or rope of man-made textile materials	56081900	
		Other twines , cordages and ropes	56089090	
<b>Export</b>				
<b>3926</b>		Other hangers	39269069	Rs. 13 Lakh
		Other article of plastic nes	39269099	
<b>5608</b>		Made up nettings of nylon	56081110	

HS family	Code	HS code description	HS codes	(2012-13)
		Other knotted netting of twine, cordage or rope of man-made textile materials	56081900	
		Other twines , cordages and ropes	56089090	

\*source: IMAcS analysis, , DGCI, DGFT

### Machinery details

Existing HDPE Woven sack processors can manufacture HDPE Agri-shade nets on the same tape extruder with an additional investment in knitting machines. Thus increasing the product mix leading to higher capacity utilization of the machinery would bring in a higher net profitability.

The raschel knitting machines used for manufacturing shade-nets are mostly imported. GCL India Pvt. Ltd (Bangalore) is one of the local manufacturers of raschel knitting machines. The key raschel knitting machinery manufacturers in the world are Karl Mayer (Germany), LIBA Maschinenfabrik GmbH (Germany) and Brückner Technology Holding GmbH (Germany).

The Indian associates / suppliers for these machinery manufacturers are:

- ATE engineering (Bombay) for Karl Mayer
- Brückner Machinery and Service India Pvt. Ltd (Pune) for Bruckner.

### Quality Standards

Bureau of Indian standards does not have a specified quality standard for anti bird and anti hail nets.

## Fishing Nets

Fishnets are key technical textiles used in fishing industry. Fishing nets are knitted fabrics used for marine and inland fishing by fisherman, fishing trawlers and boats. The characteristics and specifications of fishnets to be used vary based on the method adopted for fishing. The fishnets are manufactured on imported electric looms.

### *Product Characteristics*

Fishing nets are classified as:

- HDPE fishnets
- Nylon Mono-filament fishnets and
- Nylon Multi-filament fishnets

Fishnets are made from Nylon or HDPE twines which could be used in monofilament form or single twines twisted together for multifilament form. The basic characteristics for fishnets are transparency and invisibility in water. The critical operational characteristics of fishnets are - high tensile strength, high knot breaking strength, high abrasion resistance and low drag resistance. The mesh size ranges from 10 mm to 2,000 mm based on area and method of application. The various types of knots used for fishnet construction are single, double and U-knots. In case of multifilament nets, the number plies in the yarn varies from 2 to 36. The length and breadth dimensions of the fishnets are primarily driven by customer specifications. These nets are available in 100 m, 250 m, 500 m, 600 m and 1000 m spools.

### Market size and trade trends

The market for fishnet in India can be classified into two important segments – Nylon based fishnets and twines and that of HDPE fishnets. While major players like Garware Wall ropes are leaders in manufacturing the Nylon based fishnet market in India, the HDPE fishnet market is a highly fragmented segment. The demand for fishnet in India is driven by both the domestic and export demand of fishes from India. The fishery sector provides employment to about 14.4 lakh workers. The total fish production in India is estimated to be 9.13 million MT growing at 5% per annum. 90% of this production is consumed domestically with 10% being exported. India is the second largest producer of fish in the world with 5.43% share. Large domestic demand and lucrative export prospects are the major drivers of fishnet production in India. In addition to this, exports of fish-net from India have also risen over the last few years to Rs. 170 Crore indicating a growing demand for Indian fish-nets in the world market. Garware Wall ropes is currently the largest exporter of fishnet from India with over 50% of the market.

### **Market size estimate**

The market size of fish-nets is estimated at 18,230 MT growing at 8% for the last 5 years. Based on industry insights, the total market size including exports is estimated to be Rs. 654 Crore. However, exports constitute nearly 25% of this at Rs. 170 Crore for 2012-13.

Exhibit C-11: Market size estimate

	2012-13
Quantity (in MT)	18,230
Value (in Rs. Crore)	654

\*source: IMAcS analysis, industry sources

The market has grown at 8% during the last five years driven by growing export market which has grown to Rs. 170 Crore in 2012-13 from 67 crore in 2007-08.

### **Key growth drivers and Inhibitors**

Government of India expects Indian fish production to grow at 6% in the coming years. This would require increased focus on fishing in sea waters which currently contribute to just around 40 of total fish production in India despite having a vast coastline. There is huge potential of fishing in sea waters that remains untapped. Government support for fishing in sea waters and high value of sea food is expected to increase the share of salt water fishes in total fish production, which would ultimately drive fish net demand. In addition to it, growing value of fish exports is expected to attract more people to fishing. The domestic market of fishnets does not show a very high potential for growth and would grow along with GDP at 5% however, the exports are expected to grow at over 12% as seen from the last trend.

### **Key Manufacturers**

Garware wall ropes is the largest manufacturer of Nylon fishing nets in India. In addition to Garware wall ropes, Garware Marine, another unit of Garware group is into production of fishnets and produces close to 900 MT of fishnets. Along with Garware SRF polymer is a leading supplier of twines for fish nets. In addition to these, many small players dealing in HDPE and mono filament fishing nets are located in Tamil Nadu which has the fish net production cluster of India.

### **Import export scenario**

Fish net exports from India have grown substantially in the last five years reaching Rs. 170 Crore<sup>2</sup> in 2012-13, growing at 46% per annum. Garware has emerged to become the largest exporter of fishnet with more than 50% share. Fish net imports although have increased only marginally from Rs. 11 Crore

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<sup>2</sup> Includes export of fish net twines also

in 2007-08 to Rs. 16 Crore in 2012-13, indicating that Indian players have gone for increasing production capacity during the last five years.

Exhibit C-12: Import trends

Applicable code family	HS	HS code description	HS codes	(2012-13)	
<b>Imports</b>					
<b>5607</b>		Nylon fish net twine	56075010	Rs. 16 Crore	
		Others	56075090		
<b>5608</b>		Made up fishing nets of nylon	56081110		
		Made up fishing nets other than nylon	56081190		
		Other knotted nettings, cordages or ropes of manmade textiles	56081900		
		Other twines, cordages and ropes	56089090		
<b>5804</b>		Tulles and other net fabrics of other textile materials	58041090		
<b>Exports</b>					
<b>5607</b>		Nylon fish net twine	56075010		Rs. 170 Crore
		Others	56075090		
<b>5608</b>		Made up fishing nets of nylon	56081110		
		Made up fishing nets other than nylon	56081190		
		Other knotted nettings, cordages or ropes of manmade textiles	56081900		
		Other twines, cordages and ropes	56089090		
<b>5804</b>		Tulles and other net fabrics of other textile materials	58041090		

\*source: IMAcS analysis, DGCIS, DGFT

### Quality Standards

Beau rue of Indian standards (BIS) has the following standards for fishing nets:

- IS 4401:2006
- IS 4402: 2005
- IS 4641:2005
- IS 5815: 1993
- IS 5815:2005
- IS 5815:1993
- IS 6347:2003
- IS 6348:1971

- IS 6920:1993
- IS 8746:1993
- IS 9945:1999
- IS 15788:2008
- IS 15789:2008
- IS 5508
- IS 7533:2003
- IS 14287:1995

## **Other Products**

Besides the key product segments shown above, Agrotech also consists of Root-ball nets, fruit covers, and harvesting nets. The details of each of these products is discussed as under

### **Root ball nets**

Root ball nets are netting used to wrap roots of a new plants and shrubs. It is commonly used to provide protection to the root balls of the plant if it is being transplanted. As the roots are completely wrapped in the netting, during the transplant, issue of breaking of roots is minimised. Root ball nets are mostly used in nurseries, where transplanting of plants is a regular activity.

The advantages of root ball nets are:

- It protects root balls from damage during transportation and storage;
- It is biodegradable;
- It keep soil sticking to roots;
- It increase packing speed of root balls during transplantation, compared to covering with burlap and tying with twine;
- Ensure nice and aesthetic appearance of root balls.

Currently the market of root ball nets in India is very small with very few players in the industry. The usage is limited to only nurseries with low penetration. Currently most of the requirement in India is met through imports mostly from China. Key global manufacturers of root ball nets are Bonpack International, Netherlands, Nomanet Limited from Poland and Jetnet Corporation from USA.

### **Harvesting nets**

Harvesting nets are used for collection of fruits and flowers during the harvest. These nets are placed below the trees to prevent the fruits from falling to ground and hence prevent spoilage of fruits. Due to traditional harvesting techniques used in India, 5% to 15% loss of fruit occurs due to cracking because of falling onto the ground during harvesting. Harvesting nets aims at minimising these losses and also preventing the overall quality of fruit as the fruit does not suffer from any injuries.

Harvesting nets are high quality, UV treated nets with tear resistance usually made of PE material having a GSM ranging from 75 to 125.

The major manufacturers of harvesting nets on a global scale are the swiz company – Agroflor and the European Company Diatex.

### **Fruit covers**

Fruit covers are protection covers comprising of a fibrous fabric that allows sufficient vapour permeability to help the fruit ripe while reducing the passage of dust, small birds and insects, thereby providing protection to the fruit. Fruit covers are mostly made of polypropylene. The fruit cover can be pigmented as desired to control the sun light falling on the fruit. The key benefits of using fruit covers are:

- Protection from pests and birds
- It allows nutrient and air to permeate
- It can be used to control ripening of the fruit by controlling the permeability of fabric and the pigment of the fruit cover
- Its light weight

Fruit covers are mostly made from polypropylene through non woven manufacturing techniques. These have a GSM ranging from 15 to 25.

Currently the market of fruit covers in India is insignificant with a few limited players. The key players in the segment in India are Reliance Industries Limited, Vishal synthetics, Sunsine non-woven fabric Co. Ltd, Eco International and Karam Multipack Pvt. Ltd.

## 2. Meditech

Meditech products include textile material used in hygiene, health and personal care as well as surgical applications. The Meditech products are available in woven, knitted and non-woven forms based on the area of application. Increasingly, synthetic fibre is being used in the production of these products

### List of Products

The key technical textile products under the meditech segment are as under:

- Baby diapers
- Incontinence diapers
- Sanitary napkin
- Surgical sutures
- Disposables
- Surgical dressing
- Contact lens
- Wipes
- Artificial implants

### Market size and trends

The total market size of medical textile is estimated to be Rs. 4423 crore. Product wise market size estimate has been shown in the exhibit below

Exhibit C-13 Market-size meditech segment (summary)

	2012-13 (P)				
	(All figures in Rs. Crore)				
Product	Production	Imports	Exports	Domestic Consumption	Market Size
<b>Baby Diapers</b>	944	146	2	1,090	1,100
<b>Baby Diaper (TT Component)</b>	-	22	8	47	55
<b>Incontinence Diapers</b>	110	26	17	208	225
<b>Incontinence Diaper (TT Component)</b>	-	6	2	10	11
<b>Sanitary Napkins</b>	1397	103	1	1,500	1,500

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	2012-13 (P)				
	(All figures in Rs. Crore)				
Product	Production	Imports	Exports	Domestic Consumption	Market Size
Sanitary Napkin ( TT Component)	--	23	2	61	63
Surgical Sutures	400	340	260	740	1,000
Surgical Dressings	845	106	846	950	1796
Surgical Disposables(TT Component)	-	96	175	98	272
Contact Lenses	675	75	46	750	796
Wipes	94	7	1	100	101
Artificial Implants		262	15	483	497
<b>Total</b>					<b>4,591</b>

\*Source: IMAcS analysis P= Provisional

### Key players

Key players manufacturing medical technical textiles in India are as under:

#### Exhibit C-14 Key Players in Meditech Segment in India

Key Players in Meditech sector under each category are	
Product Category	Company Name
Baby Diapers	P&G India
	Johnson & Johnson India
	Kimberley- Clark India
	Unicharm India Pvt Ltd
Incontinence Diapers	Nobel Hygeine Pvt Ltd
	Paramount Surgimed Ltd
Sanitary Napkins	P&G India
	Johnson & Johnson India
	Kimberley Clark
	Gufic Biosciences Ltd
Sutures	Johnson & Johnson India
	Centenial Surgical Suture Ltd
	Sutures India Pvt Ltd
Contact Leses	Johnson & Johnson India
	Bausch and Lomb Eyecare India Pvt Ltd
Wipes	Johnson & Johnson India

	Pristine Care Products Pvt Ltd
	Ginni Filaments Ltd
<b>Surgical Disposables</b>	Ahlstrom Fibercomposites India Pvt.Ltd
	Thea-Tex Healthcare Pvt.Ltd
	Mediklin Healthcare Ltd
	Sivashree Meditex India Pvt Ltd
<b>Surgical Dressings</b>	KOB India
	Alves Group
	Johnson & Johnson India
	3M India
	Smith and Nephew Healthcare Pvt.Ltd
<b>Artificial Implants</b>	TTK Healthcare Ltd
	Johnson & Johnson India

The detailed analysis of each product of the segment is done in the subsequent sections.

## **Baby Diapers**

Baby diapers are used to absorb and retain body fluids of infants in period between birth and 24 months. Diapers are essentially made by a sandwich of an absorbent pad between fabric sheets. The technical textile component of the diaper is the non-woven fabric which prevents fluid leakage and gives diaper the desired shape.

### **Product characteristics**

The baby diapers are generally available in four sizes - small, medium, large and extra large, with an overall snug fitting. The typical product characteristics are as given below:

- (i) Super absorbent polymer should ensure complete dryness and prevent growth of bacteria
- (ii) The non-woven used should be hydrophilic and absorb fluids fast
- (iii) Fastening mechanism, optionally adjustable.
- (iv) The cover should be breathable
- (v) Optional, leg guards to prevent leakage

The spunbond non-woven fabric used in diapers is 20-25 GSM and accounts for close to 12-15% by weight of the diaper..

### **Market size and trade trends**

In India, there are around 65-70 million babies up to twenty months age group (census 2011), which is the potential size of the Indian baby diaper market. However, the penetration of these products has been less due to the following reasons:

- (i) Costly diaper products
- (ii) Easy availability of maid/baby sitter
- (iii) Lack of awareness amongst parents
- (iv) Diaper considered as a luxury product and not a necessity amongst masses

The penetration of diapers in urban and rural India is about 4% and 1% respectively. In future, the market will be driven primarily by increased acceptance of these products either through increased awareness or reduction in product prices.

Market-size estimate of baby diapers in 2012-13 is 1030 million pieces.

### ***Consumption norms and the market size estimate***

The non-woven fabric is 20-25 GSM and accounts for close to 12-15% by weight of the diaper i.e. around 3-4 grams per diaper.

### ***Market-size of non-woven***

Exhibit C-15 Market-size of Non-woven for baby diapers

	2012-13
Total No of diapers consumed in India (in million pieces)	1030
Amount of Non-Woven per diaper	3-3.5 gms
% of non-woven by weight(average)	~10
Exports of Non-woven by value (in Rs. Crore)	10
Total Non-woven fabric consumption(in MT)	3440MT
Total Non-woven fabric consumed by value ( Rs. Crore)	55

With an average price of Rs. 10-12 per piece, the diaper market by volume in India is approximately 1030 million pieces (the diapers are available in four sizes small, medium, large and extra large based on the baby's age). By value the diaper market about Rs. 1100 Crore. The value of the non-woven fabric in the diaper is approximately Rs. 56 Crore and expected to grow at a rate of 12-15% y-o-y, with increased penetration of diaper usage.

### **Key manufacturers of baby diapers and non-woven for baby diapers**

The baby diaper market in India is quite oligopolistic in nature; the marketing of baby diapers in India is limited to a few large companies. The baby diaper is mostly manufactured in India as the non-woven fabric is also available domestically. The major brands such as Huggies (Kimberley Clark Lever), Pampers (Procter and Gamble), Mamy Poko (Unicharm) and Wipro Baby Soft cover more than 95% of the domestic market. The key suppliers of non-woven for baby diapers in India are Surya Textech Pvt.Ltd, Alfa Foam Ltd. and Fiberweb Pvt. Ltd.

**Import export trends**

Imports and Exports for 2012-13 are as follows:

Exhibit C-16 Import-Export: Baby Diapers

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>4818</b>		48184010,48184090,48189000 and others	250 million pieces	Rs. 146 Crore
<b>Exports</b>				
<b>4818</b>		48184090,48189000 and others	1 Million pieces	Rs. 1.5 Crore

*\*source: IMAcS analysis, DGCIS, DGFT*

## Incontinence Diapers

Incontinence diaper also known as adult diapers are for people with loss of bladder control which typically applies to people in the age group of 70 years and more. Incontinence diapers are disposable single use products specifically designed to absorb and retain fluids. The diapers are typically made of the absorbent material of cellulose with poly-beads to convert fluid into gel. The non-woven material is placed on top for dry feeling.

### Product characteristics

The adult diapers are generally available in two sizes medium and large with an overall snug fitting. The typical product characteristics are as given below:

1. Super absorbent polymer should ensure complete dryness and prevent growth of bacteria
2. Super absorbent should quickly convert liquid to gel
3. The non-woven used should be hydrophilic and absorb fluids fast
4. Fastening mechanism, optionally adjustable.
5. The cover should be breathable
6. Optional, leg guards to prevent leakage

### Market size and trade trends

According to 2011 census India has in excess of 39 million adults with age equal or above 70 years. The incontinence products are expensive and have low penetration which is restricted to urban retail market and medical institutions around the country. The medical institutions account for about 40-50% of the adult diaper market volume wise. The rest is through retail markets. The estimated penetration in urban areas is 0.75%.

Market-size estimate of adult diapers in 2012-13 is 73 million pieces (approx).The future market would be driven primarily by increased awareness, penetration coupled with drop in product prices. It is expected to grow at a rate of 15-20% y-o-y.

With an average price of Rs. 25 - 50 per piece, the adult diapers market by volume in India is approximately 63.5 million pieces which is being valued at Rs.225 Crore

### Consumption norms and the market size estimate

The non-woven used for these adult diapers is around 10 grams per piece. The non-woven material gives the feeling of dryness when the fluids are absorbed and converted into a gel by the poly-beads in the absorbent material.

Exhibit C-17 Market-size of Non-woven (adult diapers industry)

	2012-13
Diaper production in 2012-13 (Million pieces)	73.5
Amount of non-woven per diaper	~10gms
Total non-woven required used (MT)	735
<b>Total non-woven market by value ( Rs. Crore)</b>	<b>11</b>

Source: Industry survey, IMaCS Analysis

### Key manufacturers of adult diapers

The adult diapers manufacturing has taken up strongly over the past one and a half year driven by the availability of the fabric and also because of increased awareness of the market potential among entrepreneurs

Kimberley-Clark Lever with Depend, Noble Hygiene with Friend's and Paramount Survived Ltd are few key players in the market. The spunbond non-woven technical textile raw material is primarily imported however non-woven fabric production has increased in India in the past 2 years.

### Imports and Exports of Adult Diapers in 2012-13

The import export trend for adult diapers is as shown

Exhibit C-18: Import-Export: Adult Diapers

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>4818</b>		48184010, 48184090, 48189000 and others	30 million pieces	Rs. 28 Crore
<b>9619</b>		96190030		
<b>Exports</b>				
<b>4818</b>		48184010,48184090,48189000 and others	10 Million pieces	Rs. 17 Crore
<b>9619</b>		96190030		

\*source: IMaCS analysis, DGCI, DGFT

## Sanitary Napkins

Sanitary napkin is a hygiene absorbent product used by women during menstrual periods. Sanitary napkins are essentially made by a sandwich of an absorbent pad between fabric sheets. The technical textile component of the diaper is the non-woven fabric which prevents fluid leakage.

### Product characteristics –

The typical product characteristics are as given below:

1. Super absorbent polymer should ensure complete dryness
2. Hydrophilic non-woven to absorb fluids fast
3. Snug fit
4. Breathable cover

The non-woven fabric is 18-20 GSM and accounts for around 11-12% by weight of the sanitary napkin i.e. around 0.95 to 1 grams per napkin.

### Market size and trade trends

The penetration of sanitary napkins is around 13% of the target population. The potential market (females in the age group of 15 years to 50 years) for sanitary napkins is around 32.5 million (Source: Census India 2011 estimates). The sale of feminine hygiene products is low due to various factors, primary being:

1. Lack of awareness, especially in rural India
2. Lack of information on the products
3. Availability of substitutes

The price per unit varies from Rs. 3 to Rs 12 (average price Rs 3.5 per unit) and the Indian feminine protection market is pegged at around Rs.1500 Crore. The market is expected to increase with increased awareness and hence, adoption level amongst women. Attempts are being made to indigenise manufacturing machines to lower the cost of production. At present, the sanitary napkin market in India is growing at the rate of 10-15% y-o-y.

### ***Consumption norms and the market size estimate:***

The non-woven fabric is 18-20 GSM and accounts for around 11-12% by weight of the sanitary napkin i.e. around 0.95 – 1 grams per napkin.

**Exhibit C-19 Market-size of Non-woven (sanitary napkin industry)**

	2012-13
Sanitary napkin usage – approx. (million pieces)	4300
Amount of non-woven per napkin (grams)	0.95
% of non-woven by weight (average)	11-12%
Total non-woven consumed (MT)	4085
Export of non woven by Value ( in Rs crore)	1.8
Total non-woven consumption by value ( Rs. Crore)	63

Source: The Indian Textile Journal, Industry survey, IMAcS Analysis

**Key manufacturers**

The sanitary napkins market in India is dominated by Procter and Gamble, Johnson and Johnson and Kimberley Clark Lever. Johnson & Johnson whose brands Stayfree and Carefree and Procter & Gamble whose brand Whisper cover close to 85-90% of sanitary napkins market. The remaining market is shared by Kimberley Clark Lever’s Kotex, Gufic Biosciences brand Shapers and other domestic brands such as Royal Hygiene Care, Actifit India Pvt. Ltd., Dima Products and Kaul Impex.Pvt.Ltd. Jayashree Industries has recently started manufacturing napkins, through an indigenous machine, where the cost of a napkin is around Rs.1 per piece.

**The Imports and Exports of Sanitary Napkin**

The import and export of sanitary napkin is shown as below:

**Exhibit C-20 Import-Export: Sanitary Napkins**

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>4818</b>		48184010,48184090,48189000 and others	613 million pieces	Rs. 103.3 Crore
<b>Exports</b>				
<b>4818</b>		48184090 and others	0.38 Million pieces	Rs. 0.5 Crore

\*source: IMAcS analysis, DGCIS, DGFT

The Non woven imported is approximately 200MT under HS Codes 39201019,39199090 and 56031100.

## **Surgical Sutures**

The surgical suture is used for stitching together skin deformations, open wounds, organs and blood vessels. The surgical sutures are classified into two categories –

1. Absorbable suture - These get dissolved in the body and do not require removal
2. Non-absorbable suture - These are sterilised sutures which need to be removed after a specified time

The type of suture used depends upon the location of the required surgical intervention. The raw material for sutures ranges from bovine intestine tissues to Poly glycolic acid (PGA), collagen, mono filament polyester / polypropylene and multifilament nylon/polypropylene/polyamide

### **Product characteristics**

The type of suture used varies based on the area of application and type of medical intervention. They could be either monofilament, multifilament or braided. Generally, absorbable sutures are used for sewing internal body organs, while non-absorbable sutures are used for external injuries. However, absorbable sutures are used in case of external injuries as well.

The general characteristics of sutures are given below:

- Sterilised (non-toxic)
- Hypoallergenic
- High tensile strength
- High knot security
- Flexible and smooth passage through tissues
- Good pliability
- Minimum tissue reaction

### **Market size and trade trends**

The key purchase decision makers for surgical sutures are medical institutions and doctors. The companies invest heavily on promotion of their products amongst surgeons, nurses and hospital administrators to promote the usage and establish trust for the brand amongst these professionals. These relationships translate into product sales going forward.

### ***Consumption norms and the market size***

The surgical suture is a 100% technical textile material except for the needle portion at one end of the suture. The size of the needle and suture depend upon the wound and area of application. J&J and Centennial Surgical Suture India Ltd control about 65-70% of the market share. Suture price varies from Rs.1300 to 3500 per dozen. The market is expected to grow at 10-15% y-o-y.

The current market of surgical suture industry is given below:-

**Exhibit C-21 Market-size: Surgical Sutures**

	<b>2012-13</b>
Surgical sutures usage in India	5.5-6 million dozens
Exports (Value)	260 Crore
Surgical sutures (Value)	1,000 Crore

Source: Industry survey, IMAcS Analysis

### **Key manufacturers**

The surgical sutures market in India is dominated by Johnson and Johnson with its flagship Vicryl brand, which has a market share of 60-65%, followed by Indian companies like Centennial Surgical Suture Ltd, Sutures India Ltd, Futura Surgicals Pvt Ltd and Lotus Surgical Pvt Ltd amongst others.

### **The imports and export of sutures**

The import and exports of surgical sutures is as shown

**Exhibit C-22 Import-Export: Surgical Sutures**

<b>Applicable code family</b>	<b>HS</b>	<b>HS codes</b>	<b>Quantity (2012-13)</b>	<b>Value (2012-2013)</b>
<b>Imports</b>				
<b>3006</b>		30061010	29 million meters approx	Rs. 340 Crore
<b>5402</b>		54023990		
<b>5404</b>		54049010, 54049090		
<b>5401</b>		54011000 and others		
<b>Exports</b>				
<b>3006</b>		30061010	4 million dozens approx	Rs. 260 Crore
<b>5402</b>		54023990		

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<b>5403</b>	5403109		
<b>5404</b>	54049090 and others		

*\*source: IMaCS analysis, DGCIS, DGFT*

## **Surgical Disposables**

The surgical disposables primarily consist of masks, caps, drapes, gowns, gloves and shoe covers made of polypropylene spunbond fabric (non-woven) with or without polyethylene film. Surgical disposables are used in hospitals and pharmaceutical companies to maintain hygienic and sterile operations. These are called as surgical disposables as these are for one time use and disposed off after one time usage. In India, the majority of hospitals use cotton reusable surgical wear which needs to be sterilised after every use. The peril of re-usage is cross contamination which should be avoided. The disposable medical items are gradually replacing the reusable cotton cloth based surgical gear. With growth in the multi-specialty hospitals, medical tourism and improvement in general hygiene level at the hospitals, the demand for medical disposables is experiencing positive growth. However, the price sensitive nature of the hospital purchase managers has resulted in the low penetration of surgical disposables.

### **Product characteristics**

The functional characteristics of surgical disposables are:

1. High barrier to blood or body fluids
2. Lower lint than linen (lint is a source of infection)
3. Proven sterilisation performance
4. Comfort and breathability
5. Good bacteria filtration efficiency
6. Breathing resistance
7. Splash resistance

The surgical disposable masks and caps are made from polypropylene (PP) spunbond fabric; spunlace fabric and Spunbond melt blown fabric and spunlace fabric (SMS) fabric. The weight of the fabric for caps is typically in the range of 12-25 GSM and for masks it is in the range of 25-40 GSM. The disposable drapes, gowns and covers are made of polypropylene (PP) spunbond fabric and Spunbond melt blown fabric and spunlace fabric (SMS). The weight of the fabric is typically 25-40 GSM for spunbond fabric for gowns and around 35-50 GSM for SMS fabric for drapes and covers.

These products are manufactured in sterilised environment and packed in PP bags and dispenser boxes sterilised before despatch.

### **Market size and trade trends**

The growth of medical textile products is tied with the growth of the healthcare industry in India. The healthcare consumption in India is expected to grow to \$170 billion as per Frost & Sullivan. The rural India is expected to follow the increasing healthcare spend trend of urban India. The demand for disposables is expected to increase with the emergence of new tertiary care hospitals with international accreditations and improvement of service levels off the existing hospitals. In addition, the growth in pharmaceutical, biomedical and biotechnological companies would augment the demand for medical textiles especially disposables.

### ***Consumption norms and the market size estimate***

The penetration of surgical disposable products is limited primarily to the hospitals in metro and cosmopolitan cities and tertiary care hospitals. The larger hospitals in the major cosmopolitan cities in India (Delhi, Mumbai, Kolkata, Chennai, Bangalore and Hyderabad) account for nearly 5.5-6% of total beds in India. Almost all of these hospitals are using surgical disposables. The penetration of surgical disposables in the remaining hospitals is estimated to be around 15%. In addition, the usage of surgical disposables (masks and caps) in pharmaceutical companies has been assumed as 15% of the usage in hospitals based on the industry survey

The average price of surgical disposables like caps, masks and shoe-covers is around 70 to 90 paisa per piece while that of drapes is Rs 350 per units and of gowns and covers is around Rs 55 per unit. The medical disposables like caps, masks and shoe covers are 100% technical textile products made-up from PP spunbond or SMS non-woven fabric. The consumption of Polypropylene (PP) spunbond material and SMS fabric varies with size of the product. The product used for drapes and gowns is typically 25 GSM and 80 GSM. The average size of spunbond fabric per material is around 2 square metres. The typical weight of these products varies from 50 grams to 160 grams. Spunlace material is also used in this manufacture of surgical disposables. The caps and masks require approximately 3 grams of PP spun bond fabric while shoe-covers require 6 grams of PP spun bond fabric per unit. The raw materials account for 80-90% of the cost.

#### **Exhibit C-23 Non-woven consumption norms (surgical disposables industry)**

<b>Description</b>	<b>Value</b>
Usage caps, masks & shoe covers per month in 300 bed hospital (pieces)	8,000 to11,000

Description	Value
Usage drapes, gowns & covers per month in 300 bed hospital (pieces)	150 to 200
Amount of non-woven per cap/mask	3 g
Amount of non-woven per shoe-cover	6 g
Amount of non-woven per drape, gown & cover	50 to 150 g
Average price per cap / mask / shoe cover	Rs 0.7 to 0.9
Average price per drape	Rs 320
Average price per gown / cover	Rs 55

Source: Industry survey, IMAcS Analysis

The domestic usage of the surgical disposables – caps, masks & shoe covers in India is estimated at around 80 million pieces annually. The domestic usage of the surgical disposables – drapes, gowns & covers in India is estimated at around 1.75 to 2.5 million pieces annually. The market is expected to grow at 10% y-o-y. The consumption in the surgical disposables market is given below:-

**Exhibit C-24 Market-size of Non-woven (Surgical Disposables Industry)**

	2012-13
Non-woven fabric (Domestic Quantity)	~2100 MT
Non-woven fabric (Export Quantity)	~2300 MT
Market of Non-woven ( Quantity)	4400 MT
Market of Non-woven ( Value)	Rs.272 Crore

Source: Industry survey, IMAcS Analysis.

**Key manufacturers**

The surgical disposables market in India is in its infancy stage. There are very few manufacturers of surgical disposable items in India. The imported surgical disposables from China are also available in the market. The major producers of surgical disposables are:-

1. Ahlstrom Fibercomposites India Pvt.Ltd
2. Thea-TEX Healthcare Pvt. Ltd.
3. Mediklin Healthcare Ltd.
4. Magnum Medicare Pvt. Ltd.
5. Sivashree Medittex India Pvt Ltd
6. Surgiwear India

7. Dispoline

**Import Export trends**

Imports & Exports of surgical disposables is as given in the table below:

Exhibit C-25 Import-Export: Surgical Disposables

Applicable HS code family	HS codes	Quantity (million pieces) (2012-13)	Value (2012-13)
<b>Imports</b>			
<b>4015</b>	40159010, 40151100	Masks-0.12	Rs.96 Crore
<b>5603</b>	56031200, 56031100, 56039400	Caps-2.1 Drape and Gowns-5.5	
<b>6210</b>	62101000	Gloves-325 pairs	
<b>6307</b>	63079090 and others	Shoe Covers-1 Others ( bed covers, table covers, pillow covers, curtains etc)-9	
<b>Exports</b>			
<b>4015</b>	40159010, 40151100	Masks-1.2	Rs.174.5 Crore
<b>5603</b>	56031100,56031200,56039400	Caps-3	
<b>6210</b>	62101000	Drape and Gowns-1.1	
<b>6307</b>	63079090 and others	Gloves-123 (pairs) Shoe Covers-13 Others ( bed covers, table covers, pillow covers, curtains etc)-0.16	

\*source: IMAcS analysis, DGCIS, DGFT

**Raw-materials and machineries -**

The raw material for the medical disposables is PP spunbond non-woven fabric. These products are made on Taiwanese or Chinese fully automatic machines. The machines are made by companies in China and Taiwan under the tag of non-woven converting machine manufacturers.

**Quality Control and Standards -**

There are no Indian standards. The gowns and drapes manufactured in India are compliant with AAMI PB 70 (Association for the Advancement of Medical Instrumentation) standards. For the mask products - ASTM F2101-01 is used as standard for the bacteria filtration efficiency. The Delta-P standard is used to set the breathing resistance and ASTM 1862 is used to set the splash resistance.

## Surgical Dressing Material

Surgical dressing material is applied on the wound to expedite the process of healing and prevent further harm due to wound exposure. The dressing material can be primarily divided as

- Bandage
- Wound care layer

Bandage holds the wound care layer in place. Wound care products which are adhesive in nature are also available in the market. The bandage can also be used on standalone basis in case of orthopaedic cases (e.g. crepe bandage). The type of dressing used varies based on the type of wound and location of the wound. Typically, the wound care products consist of:-

- Absorbent pad
- Non-adhering/dressing
- Adhering pads or adhesive plaster

The wound contact material is available in both woven and non-woven forms.

The bandage products consist of:-

- Rolled Bandage
- Gauze bandage
- Elastic/Non-elastic bandage
- Light support bandage

### Product characteristics

The materials included under surgical dressings are: Rolled bandages, Crepe bandages, Plaster-of-Paris bandages, Absorbent gauze pack, plaster, absorbent pads and surgical pads

The raw materials for surgical dressings are cotton fibre, viscose and acrylic. The functional properties like absorbency are improved for dressing material. Additionally, these products could be sterilised or non-sterilised. The wound contact layer is either woven medicated layer or non-woven medicated layer. The wound contact layer is non-adherent and allows new tissue to develop easily. Non-adherent hypoallergenic, gamma sterile dressing allows easy wound-drainage. It is soothing, enhances healing in burns, skin grafts, skin loss and lacerated wounds. The bandages provide support to the dressing material and function as compression material. Cotton gauze cloth is generally used for holding wound

contact layer in place which is tied at the ends or joints using adhesive tape. Bandages are also made from polyester yarns. The bandages have a basis weight in the range of 55-60 GSM.

**Crepe bandages / compression bandages:** are knitted bandages made from thick woven polyester fabric which have an elastic behaviour and porous nature for skin breathing. These bandages are used on limbs to create resting pressure and working pressure for the treatment. The crepe bandages are manufactured by weaving and warping the yarn and then processed to give properties like stretch ability. The crepe bandages are available in various sizes like 5, 7.5, 15 centimetre x 3 meter.

**Plaster-of-Paris (POP) bandages:** are made of cotton gauze or leno weave cloth with Plaster-of-Paris impregnated. The leno weave holds the POP material in the fabric. The bandage is dipped in water and applied on the limb which would graduate into a hard cast once dried. The POP bandages are available in various sizes like ~10, 15, 20 centimetre x 3 meter.

**Dressing pads and absorbent gauze** generally have basis weight of around 30 GSM. These pads and absorbents are available across various sizes. Cohesive bandages stick to themselves and not to the user's skin. Hence, they are suited for skin protection applications. Adhesive plaster (medicated or not medicated) is available in various lengths and shapes. The wound dressing material should be sterile, breathable and should provide a moist healing environment. The healing environment then reduces the risk of infection and helps the wound heal more quickly.

All the surgical dressing items are expected to be ISI, USP or BP compliant

### **Market size and trade trends**

The demand for surgical dressing material is primarily driven by boom in the healthcare sector and increase in hospital beds in the country. In addition to the domestic market, Indian dressing materials are also exported to several countries. The industry is primarily unorganised with units in across Tamil Nadu, Mumbai, Uttar Pradesh, Ichalkaranji, amongst others. The market for dressing material is primarily institutional with a share of around 60% of sales and the remainder is retail.

### Usage norms per bed of surgical dressings (OPD adjusted)

Exhibit C-26 Usage norms: Surgical Dressings

Rolled bandage	Around 100 units of 14 cm * 6 m (or equivalent)
Crepe bandage	Around 15 units of 10cm * 4 m (or equivalent)
POP bandage	Around 10 units of 10 cm width (or equivalent)
Elastic adhesive bandage	Around 1.5 units
Band-aid / adhesive tape	Around 20 units
Absorbent cotton wool	Around 10 units of 500 g
Absorbent gauze	Around 20 units
Surgical pad	Around 2.5 units

Source: Industry survey, IMAcS Analysis

In the past 6 years the government spending on the health sector has grown at a rate of 20% and with the surge of new private hospitals with improved services and the growth of medical tourism the surgical dressing industry is expected to grow at a rate of 5-6% y-o-y.

The current surgical dressing material industry is given below:

Exhibit C-27 Market-size: Surgical Dressings

Surgical dressings usage in India	2012-13
Surgical dressings (bandages)	Rs 500 Crore approx.
Surgical dressings (wound care products)	Rs 450 Crore approx.
Exports of surgical dressings	Rs. 846 Crore
Surgical dressings (Total)	~Rs 1796 Crore

Source: Industry survey, IMAcS Analysis

### Key manufacturers

The industry is primarily unorganised with units in various states / areas of India including Tamil Nadu, Mumbai, Uttar Pradesh and Ichalkaranji, amongst others. The organised producers of the surgical dressings are as follows:-

- Johnson and Johnson India

- Lavino Kapoor – Absorbent cotton – 100% EOU
- Dr. Sabharwal Laboratories
- Ramanathan Surgicals Private Limited
- KOB textile – Dressing Material - 100% EOU (Export Oriented Unit)
- Ramaraju Surgical Cotton Limited
- Shanti Surgicals
- Jajoo Surgicals Private Limited
- Alves Industries

### Import Export trends

Imports and Exports of surgical dressing material in 2012-13 is as given in the following table

Exhibit C-28 Import-Export: Surgical Dressings

Applicable HS code family	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>			
<b>3005</b>	30051010,30051020,30051090,30059010,30059030,30059040,30059050,30059060 and others	800 '000kgs	Rs.105.5 Crore approx
<b>Exports</b>			
<b>3005</b>	30051010,30051020,30051090,30059010,30059030,30059040,30059050,30059060,30051090	56210'000kgs	Rs.846 Crore approx
<b>5601</b>	56012110, 56012190 and others,		

\*source: IMAcS analysis, DGCIS, DGFT

### Quality Control and Standards

The products require approval for usage by the medical authority. For handloom cotton bandages, the applicable standard is IS863 and for cotton gauze absorbents, the applicable standard is IS758. Several manufacturers also have ISI mark and ISO certification for their products and units respectively. All the surgical dressing items are expected to be ISI, United States Pharmacopoeia (USP) or British Pharmacopoeia (BP) compliant.

## Contact Lenses

The contact lenses are typically used to correct vision, although some people wear coloured contact lens to enhance or change their eye colour. The contact lenses can be classified based on type of material, replacement cycle, wear schedule and special applications:-

- Material types (soft, hard and gas-permeable),
- Replacement schedule (daily, fortnightly, monthly, quarterly and yearly),
- Wear schedule (Daily wear and extended wear),
- Special types (tonics for astigmatism, UV-blocking contacts, bifocals etc).

Soft Contact Lenses are made from a water absorbing material called HEMA (Hydroxyl Ethyl Metha Acrylate) and are very soft to handle and comfortable on the eyes. Disposables are the most hygienic option as they are replaced after a particular period —daily, fortnightly, monthly or quarterly.

Hard contact lenses are made of some variant of polymethyl methacrylate (PMMA) and are obsolete. RGP lenses are semi-rigid lenses made usually from silicones which allow oxygen through to the eye. Toric soft lenses are used in cases of high cylindrical power or astigmatism. A comfortable option over semi-soft lenses, it is available as both conventional and disposable. Bifocal contact lenses are prescribed for those who prefer contact lens correction for Presbyopia or difficulty in near vision. Cosmetic contact lenses are available in different colours and tints, in both power and Plano, with conventional and disposable options. These are principally worn to enhance looks.

Contact lens market in India is dominated by soft and disposable contact lenses.

### **Market size and trade trends**

It is estimated that nearly 30% per cent of the population in India requires vision correction. Though about 36 Crore people need glasses, only about 11-12 Crore people wear them. Contact lenses are slowly making inroads in the spectacles market in India - from 1.5 Lakh users in the mid-1990s, there are now over 50 Lakh contact lens users in India. The market penetration of contact lenses in India is extremely low (only 5 per cent of the people taking up vision correction). Contact lenses are usually used

with a back-up of spectacles and that is how the market is estimated. The industry is expected to grow at 15-20% on account of changing lifestyle, higher purchasing power and favourable demography.

### **Contact lens usage in India**

Exhibit C-29: Market-Size: Contact Lenses

Population requiring vision correction	Around 39 Crore
Eyewear market (total)	Around 11-12 Crore users
Contact Lens Penetration	5%
Contact lens market (per annum)	Around 60 Lakh users
<b>Exports</b>	Around Rs.46 Crore
Contact Lens Market (Value)	Around Rs.796 Crore

Source: Industry sources, IMaCS analysis

The major players in the contact lens industry are Johnson & Johnson Vision Care Pvt Ltd, Novartis, Bausch & Lomb Eyecare India Pvt Ltd and Silklens.Pvt.Ltd.

The contact lenses market in India is growing at CAGR of about 25%. Besides, about 40 Crore pairs of contact lens are sold annually across India and the market is estimated at about Rs 700 Crore<sup>3</sup>. Growth in market for contact lenses is led by growing demand for daily disposables and frequent replacement contacts including coloured contacts amid youth especially, the college going crowd as they mix and match the colour of lenses with their wardrobe.

### **The imports and exports of contact lenses are as given below in:**

Exhibit C-30: Import-Export: Contact Lenses

Applicable HS code family	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>			
<b>9001</b>	90013000	5.25 million pairs	Rs.74.5 Crore
<b>9002</b>	90029000 and others		

<sup>3</sup> Source: ASSOCHAM Study 2012

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Applicable HS code family	HS codes	Quantity (2012-13)	Value (2012-13)
			approx
<b>Exports</b>			
<b>9001</b>	90013000, 90014090	8.7 million	Rs.46 Crore
<b>9002</b>	90029000 and others	pairs	approx

\*source: IMAcS analysis, DGCIS, DGFT

## Wipes

Typically wipes are used to clean surfaces. They can be in dry or wet form. Disposable non-woven wipes are increasingly used for various personal, household and industrial purposes. Mostly tissue based or spunlace non-woven fabric is used to manufacture wipes.

### Product Characteristics:

The key properties required for wipes are as follows:

- High Absorption
- Low Static and gliding friction
- Good cleaning efficiency
- Lint free
- Non-allergic

The key ingredient or variable is nonwoven Spunlace fabric used as basic raw material and other variable being flexible packaging film for packing single pouch, multiple wipes C fold pouches or plastic dispensers. The product used is typically 40-45 gsm. Seasonal factors play important role with summer considered as peak season and rainy season as off season for market sales.

### Market size and trade trends

Today, there are different categories of wipes available in India focusing on various segments like baby wipes, antibacterial wipes, nail polish remover wipes, cosmetic wipes, make up remover wet wipes, cleaning wipes, disinfectant & personal hygiene wipes. However, personal hygiene wipes and baby wipes hold majority of the market.

The annual consumption of wipes in India is about 1260 MT. The average market price of a 1wipe is Rs.1.5. The market for wipes in India is around Rs.101 Crore. The market is expected to grow at 15-20% y-o-y.

Exhibit C-31: Market size estimate

	2012-13
Quantity (in MT)	1,260
Value (in Rs. Crore)	101

*\*source: IMAcS analysis, industry sources*

**Import and Export of wipes is as given in the table below:**

Exhibit C-32-Import-Export: Wipes

Applicable HS code family	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>			
<b>4818</b>	48182000,48189000,48184090	526 Tonnes	Rs.6.5 Crore
<b>4803</b>	48030010		
<b>Exports</b>			
<b>4818</b>	48182000,48184090,48189000	326 Tonnes	Rs.1.13 Crore
<b>5603</b>	56031200		

*\*source: IMAcS analysis, DGCIS, DGFT*

**Key Manufacturers:**

The major players in wipes industry are Johnson & Johnson, Pristine Care products Pvt Ltd ,Ginni Filaments Ltd, Kimberly-Clark, Himalaya Health Care Pvt Ltd ,Kara Wipes by Aditya Birla Group and Tainwala Personal Care Pvt Ltd

## **Artificial Implants**

Artificial implants are the artificial organs used for replacement to the original body organs through medical surgeries. These include:

- Artificial Heart Valves
- Artificial Vascular Grafts
- Artificial Kidney
- Artificial Joints
- Artificial Tendon/Mesh
- Artificial Ligaments
- Artificial Skin
- Artificial Heart
- Artificial Liver
- Artificial Lungs
- Artificial Cornea

With the rise in medical tourism and increase in hospitals in the country, the industry is expected to grow at 15-20% y-o-y.

**Each of the above implant description and market players respectively is as under:**

## Artificial Heart Valves

Artificial heart valves are implanted in the heart of the patients who need treatment for valve related diseases. The natural heart valve needs a replacement when two or more valves stop functioning properly. Generally an open heart surgery is performed to replace the valve. There are two types of artificial heart valves – Mechanical heart valve and Tissue heart valve

The mechanical heart valves last almost indefinitely, however, they need continuous treatment with anticoagulants. The tissue valves on the other side do not need anti-coagulants, however, they have shorter life span.

### Product characteristics

The heart valve has three parts, a metallic housing, a disc or ball which functions as occlude and a sewing ring made of synthetic material. The functional requirement of heart valves are as follows:

1. Minimum regurgitation
2. Minimum trans-vascular pressure gradient
3. Non-thrombogenic
4. Low wear/tear
5. Minimal leakage
6. Appropriate valve orifice to anatomical orifice ratio

The mechanical heart valve consists of Ultra high molecular weight-polyethylene (UHMW-PE) disc, Low density polyethylene plastic with knitted polyester sewing ring and a metallic housing. The Sewing Ring is fabricated from extensively implant tested, 100% polyester material. The Sewing Ring fabric is warp - knitted in a specific pattern using texturized yarn with superb tissue in growth and long term blood compatibility. The design and fabrication of the sewing ring gives a firm and secure seating on the frame and also permits rotation in the ring for proper orientation after suturing in place.

### Market and Key manufacturers

TTK Healthcare in collaboration with Sri Chitra Tirunal is the only domestic manufacturer. TTK has capacity to produce 20,000 heart valves in a year. Other large foreign players who hold about 70-75% of the market share are Edwards Life Sciences, St. Judes Inc., etc.

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The current market of Heart Valves is about 50,000-55,000 pieces with a value of about Rs.110 Crore.

**Exhibit C-33: Market size estimate**

	2012-13
<b>Quantity (in '000 pieces)</b>	50 - 55
<b>Value (in Rs. Crore)</b>	110

*\*source: IMAcS analysis, industry sources,*

**Import and Export of artificial heart valves is as given in the table below:**

**Exhibit C-34 Import-Export: Artificial Heart Valves**

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>9018</b>		90183990,90181990 and others	45034 in nos	Rs.99.45 Crore
<b>Exports</b>				
<b>Nil</b>				

*\*source: IMAcS analysis, DGCIS, DGFT*

## Artificial Vascular Grafts

Vascular diseases are characterised by variations to the geometry and structure of the walls of the blood vessels. Variations in the mechanical characteristics of the vessels result in multiple complications like Thrombosis, Aneurysm and Arteriosclerosis

### Product characteristics

In order to function effectively, the grafts need to have special characteristics like – non-thrombogenic surface, elasticity and compliance, long-term tensile strength, bio-compatibility, durability, bacteria resistance, etc. The type of fabric used for prostheses is woven fabric or knitted fabric. The knitted fabric is easy to suture and well suited for aortic replacement however not for large diameter vessels. The knitted fabric is porous and needs to be clotted with patient's blood before usage. On the other hand, the woven fabric has the strongest construction but is difficult to suture. Most textile grafts for large and medium artery replacement are made of either PET (polyethylene terephthalate, commercial name Dacron) or PTFE (polytetrafluoro ethylene, commercial name Teflon).

### Market and Key manufacturers

TTK Healthcare in collaboration with Sri Chitra Tirunal is the pioneer of vascular grafts in India. However, products are still under clinical trials. TTK Healthcare is testing indigenously developed grafts with South Indian Textile Research Association (SITRA). In 2012, Vascular Concepts has set up India's first state-of-art facility in Bangalore for R&D and production of vascular grafts. The current demand is met through imports.

The current market of Vascular Graft is estimated to be around Rs.25 Crore.

Exhibit C-35: Market size estimate

	2012-13
Quantity (in nos.)	18,000
Value (in Rs. Crore)	25

\*source: IMAcS analysis, industry sources,

**Import Export trends**

Import and Export of Vascular Grafts is as given in the table below:

Exhibit C-36: Import-Export: Artificial Vascular Grafts

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>9018</b>		90183990,90181990,90189099 and others	~18000 in nos	Rs.22 Crore
<b>Exports</b>				
<b>9018</b>		90181990	4 in nos	Rs. 0.5 Crore

*\*source: IMAcS analysis, DGCIS, DGFT*

## Artificial Kidney / Dialysers

Kidney serves the filtering mechanism of the blood. The kidney has a mechanical substitute in kidney dialysis machine. The kidney dialysis machine is outside the body and purifies the blood using a filter called the haemodialysor. The haemodialysor is made primarily of polysulphone and polyacetate.

The main element in a dialyser is a semipermeable membrane through which small molecules can pass by diffusion. Dialysers are encountered in medical work in renal dialysis where unwanted small molecules (e.g. urea) and water can be removed from the body. Haemodialysers (sometimes called artificial kidneys) take blood from the body and pass it along one side of the dialysing membrane so that unwanted small molecules may diffuse into a special dialysing fluid passing along the other side. Small molecules which need not be removed are included in the dialysate so that there is equal diffusion of these molecules in each direction.

### Product characteristics

The primary function of the artificial kidney is to purify the blood. The filtration medium used is hollow viscose or hollow polyester fibre. The typical characteristics of the fabric are:

- Low linting,
- High durability,
- Good capillary action,
- Good absorbency,
- Biodegradability and
- Inert behaviour

### Market and Key Manufacturers

There are no manufacturers of artificial kidney in India presently, except Nipro Corp. The Japanese company has set up India's first artificial kidney manufacturing plant in Pune in 2012-13. India is a net importer of artificial kidney. The membrane or dialysers are 100% technical textile products made up of polysulphane and polyacetate.

The current market of Artificial Kidneys is about Rs.48 Crore.

Exhibit C-37: Market size estimate

	2012-13
Quantity (in Million nos)	1.97

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	2012-13
<b>Value (in Rs. Crore)</b>	48

*\*source: IMAcS analysis, industry sources,*

**Import Export trends**

Import and Export of artificial kidney is as given in the table below:

**Exhibit C-38 Import-Export:Artificial Kidney**

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>9018</b>		90189031	1.92 million nos	Rs.46.7 Crore
<b>Exports</b>				
<b>Nil</b>				

*\*source: IMAcS analysis, DGCIS, DGFT*

## Artificial Joints

The orthopaedic joints are used for patients suffering from arthritis and accidental damage of joints. The joints are made such that they are compatible with the human body.

### Product characteristics

The artificial joints are primarily made of Titanium, Stainless Steel and Chromium Cobalt, materials which exhibit compatibility with the human body. The technical textile component in joints is Ultra High Molecular Weight High Density Polyethylene (UHMWHDPE) material.

### Market and Key Manufacturers

A few manufacturers of artificial joints in India are TTK Healthcare Ltd and Narang Medical Ltd. Other players in the market are Smith & Mathew Orthopedic India, Zimmer India Pvt.Ltd, Globus Medical India Pvt.Ltd etc. The current market is expected to be around Rs.105-110 Crore growing at a rate of about 15% y-o-y.

#### Exhibit C-39: Market size estimate

	2012-13
Quantity (in '000 nos.)	107 - 112
Value (in Rs. Crore)	105 -110

\*source: IMAcS analysis, industry sources,

### Import Export trends

Import and Export of artificial joints is as given in the table below:

#### Exhibit C-40 Import-Export: Artificial Joints

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>9012</b>		90213100,90213900 and others	~87000 nos	Rs.85.2 Crore
<b>Exports</b>				
<b>9021</b>		90213100,90213900 and others	~17200 nos	Rs.13.5 Crore

\*source: IMAcS analysis, DGCIS, DGFT

## Artificial Tendon (Hernia Mesh)

Artificial Tendons or meshes are used in hernia repair and abdominal wall replacement, where mechanical strength and fixation are very important. The long term function of the mesh is optimised by adjusting the porosity and the texture of the mesh.

### Product characteristics

The mesh could either be woven or knitted based on the requirement of strength. Polypropylene, Polyester mesh is primarily used in hernia repair as it is resistant to infections. GOR-TEX is also used for making mesh for hernia repair. The size varies from 2"x4" to 10"x14".

### Market and Key Manufacturers

Hernia repair is one of the most common surgery performed all over the world. The same is true about India. With more than a billion population, the number of hernia patients in India perhaps run in millions. According to a research and consulting firm Global Data, India is poised to hold 37% of the global hernia repair market by 2019 and holds about 30% of the global market in 2012.

TTK Healthcare and Johnson & Johnson are the key market players along with Lotus Surgicals Pvt Ltd. The market for hernia mesh is expected to be Rs. 200 Crore.

Exhibit C-41: Market size estimate

	2012-13
Value (in Rs. Crore)	200

\*source: IMAcS analysis, industry sources,

### Import Export trends

Import and Export of artificial tendon (mesh) is as given in the table below:

Exhibit C-42 Import-Export: Artificial Tendon/Mesh

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
9021		90213900	~58000 nos	Rs.4.7 Crore

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Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>9018</b>		90181990,90183990 and others		
<b>Exports</b>				
<b>9018</b>		90181990, 90183990 and others	~8100 nos	Rs.0.72 Crore

\*source: IMAcS analysis, DGCIS, DGFT

## Artificial Ligaments

An artificial ligament is medical device for joining ends of two bones. The artificial ligaments are made from man-made fibres like polyester. The usage of the ligament varies based on type of operation. The artificial ligaments are generally subject to lot of wear and tear. They also carry a risk of septic arthritis.

### Product characteristics

Ligament is a multilayered or tubular woven structure having intra-articular region, at least one bend region and end regions. Each region is woven so as to possess the required flexibility and strength. Polyethylene Teraphthalate (PET) is primarily used for manufacturing artificial ligaments. The artificial ligament must be bio-compatible with contact blood and tissue and should have good bonding strength.

### Import Export trends

Import and Export of ligaments is as given in the table below:

Exhibit C-43: Import-Export: Artificial Ligaments

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>9021</b>		90212900	~1900 nos	Rs.3.17 Crore
<b>Exports</b>				
<b>9021</b>		90211000	~37 nos	Rs.0.15 Crore

\*source: IMAcS analysis, DGCI, DGFT

## Artificial Skin

Skin grafting is the procedure of replacing dead skin with live skin. There are two primary methods of skin grafting – Autologous skin graft and allograft transfers. The autologous skin graft transfers skin from one part of the body to another. The allograft transfers skin from the bodies of other people / cadaver. Allografts offer only temporary cover, as they are quickly rejected by a person’s immune system.

The artificial skin is used in the skin grafting process. After removing burnt / damaged skin, surgeons blanket the wound with a covering (artificial skin) before applying a skin graft on top of this biomaterial to encourage the growth of new skin to close the wound.

### Product characteristics

Artificial skin consists of two layers. The bottom layer, which is designed to regenerate the lower layer of real skin, is composed of a matrix of interwoven bovine collagen (a fibrous cow protein) and a sticky carbohydrate (sugar) molecule called glycosaminoglycan, which mimics the fibrous pattern of the bottom layer of skin. This matrix then sticks to a temporary upper layer: a medical-grade, flexible silicon sheet that mimics the top, epidermal layer of skin. Integra® is major brand in artificial skin grafts. The Integra® skin grafts look somewhat like translucent plastic wrap.

### Import Export trends

Import and Export of artificial skin is as given in the table below:

Exhibit C-44: Import-Export: Artificial Skin

Applicable code family	HS	HS codes	Quantity (2012-13)	Value (2012-13)
<b>Imports</b>				
<b>9021</b>		90211100	~170 nos	Rs.0.35 Crore
<b>Exports</b>				
<b>Nil</b>				

\*source: IMAcS analysis, DGCIS, DGFT

## **Other key artificial implants**

### **Artificial Heart**

In India, about 20 million patients suffer from heart failure every year. The number of heart failures is increasing by two million annually. About 20% of these patients die without medical-aid. The artificial heart is intended for use in patients whose hearts have been irreparably damaged left and/or right ventricles, and for whom, existing methods of surgical intervention and/or drug therapy are inadequate. Heart transplantation is limited by availability of donor organs. The first heart transplant in India was done in 2008. States like Maharashtra, Tamil Nadu and Andhra have initiated programmes to promote body part transplantation. However, no heart transplant has happened in Maharashtra and about 57 in Tamil Nadu since 2008. At present, donor supply limits heart transplantation. There is immense potential for artificial hearts. However, the cost of devices range from Rs.30 lakh to Rs.70 lakh and the overall cost of surgery from Rs.35 Lakh to Rs.1 Crore.

### **Artificial Liver**

Earlier, artificial support systems were not widely used in cases of liver failure, primarily because hepatic toxins are albumin-bound unlike most uremic toxins and hence cannot be removed by conventional dialysis. Recently, advances have been made for the removal of hepatic toxins making it now possible to support the patient with liver failure till the liver recovers or until liver transplantation is feasible.

The major artificial liver support systems are – Peritoneal dialysis, Haemodialysis, Hemofiltration, Continuous renal replacement therapy, Charcoal Haemoperfusion, Plasma exchange, Biologic – DT sorbent System and Molecular adsorbent recirculating system

In this system, patient's blood or plasma is pumped into bioreactors, which are hollow fibre devices, seeded on the dialysate side with freshly isolated or cryopreserved porcine hepatocytes or transformed human hepatoma cell line.

Apollo Hospitals has done more than 500 liver transplantation surgeries in India. Cadaver donation or donation from brain dead patients is still the main source of transplants. The artificial lung does have a niche market in India. The cost of a liver transplantation is around Rs.25-35 Lakh.

### **Artificial Lung**

Totally artificial lungs are not completely commercial. However, heart-lung machines are available in the market. The artificial lung device is connected to the heart's right ventricle. It relies on the heart—not a mechanical pump—to send blood through the lung, where it receives oxygen (and offloads carbon dioxide) as it flows through the arrays of microfibers or membrane oxygenators. Oxygen rich blood passes from the device into the left atrium and then to the rest of the body. The microfibers or the membrane oxy-generator are the technical textile component in the device.

### **Artificial Cornea**

The cornea is the transparent front portion of the eye that permits light to enter the eye. Normally crystal clear, it can become cloudy or misshapen, causing gravely reduced vision or blindness. Diseased corneas can be replaced successfully through transplantation (medically termed "keratoplasty") using human donor cornea or artificial cornea (Keratoprosthesis). Human donors are primarily used for transplantation in India. Keratoprosthesis is made of clear plastic with excellent tissue tolerance and optical properties. The polymers used in artificial cornea need to be bio-compatible, flexible, sufficient mechanical strength.

### ***Product characteristics***

The Keratoprosthesis or artificial cornea is made using following materials:

- Poly methyl methacrylate (PMMA)
- Poly 2-hydroxyethyl methacrylate hydrogels (PHEMA)
- Poly vinyl alcohol (PVA)

The artificial cornea is expected to have the following characteristics:

Withstand intraocular pressure

- Be transparent
- Have appropriate curvature
- Have suitable refractive index
- Sufficient tensile strength to allow surgical manipulation and fixation
- Scratch resistance

### **3. Mobiltech**

Mobiltech segment of technical textile products includes applications in automotive and automotive components (including aircrafts and railways).

#### ***List of Products***

The key technical textile products covered under mobiltech are as given below:-

- Nylon tyre cord
- Seat belt webbing
- Airbags
- Car body covers
- Seat upholstery/fabric
- Automotive carpets
- Headliners
- Insulation felts (NVH components)
- Sunvisors / sunblinds
- Helmets
- Airline disposables
- Webbing for aircrafts
- Aircraft upholstery
- Railways seating fabrics

#### **Market size and trends**

The total estimated market size of Mobiltech is estimated to be Rs. 6742.72 crore with nylon tyre cord taking 49% share in the segment. Other key product is helmets that has about 15% share. Seat covers or upholstery constitutes about 12.70% of the mobiltech segment by value. The demand in this segment is directly fuelled by the growth of automotive industry.

The domestic consumption in Mobiltech stands at Rs. 6587.61 Crore and exports total a Rs. 398.14 Crore.

Exhibit -C-45: Market size estimation for Mobiltech segment

(in Crore of Rupees)	2012-13				
Product	Production	Import	Export	Domestic Consumption	Market size
Nylon Tyre Cord	3,299	--	109	3,190	3,299
Seat belt webbing	62	90	32	120	152
Airbags (TT component)	--	440 <sup>4</sup>	12	94	106
Car body covers	47	--	--	47	47
Seat covers fabric/upholstery	592	264	2	854	856
Automotive interior carpets	244	9	--	353	353
Headliners (TT component)	66	12	--	78	78
Insulation felts	610	3	--	612	612
Sunvisors/sunblinds	127	20	--	147	147
Helmets	--*	--	--	1,015	1,015
Airlines disposable*	--	--	--	--	0
Webbings for aircraft*	--	--	--	--	--
Aircraft upholstery	--	77	--	77	77
TT usage in railways	1	--	--	1	1
<b>Total</b>		<b>913</b>	<b>155</b>	<b>6,588</b>	<b>6,743</b>

Source: IMaCS analysis

\*Import data is still under verification.

<sup>4</sup> These are inclusive of complete assemblies and not just the technical textile component.

## Nylon Tyre Cord

Nylon tyre cord provides reinforcement for all types of tyres. Nylon tyre cord is made from high tenacity continuous filament yarn by twisting and plying. The major criteria for acceptance of any material in tyre are its tensile strength, dimensional stability, durability, thermal stability, hysteresis and adhesion.

### *Product Characteristics*

Nylon 6 grey and dipped tyre cord fabrics having high strength, fatigue resistance, impact resistance, high adhesion characteristics, are mainly used as reinforcements of bias tyres. The tyre cords are generally available with the fabric characteristics of 930dtex, 1400dtex, 1870dtex, 2100dtex. The critical specifications drive the characteristics such as Breaking strength, elongation, adhesion, ply twists and hot-air shrinkage.

### Market size and trade trends

Nylon tyre cords industry, follows the movement of the tyre industry which in turn moves in tandem with the automobile industry. In the past financial year, major tyre companies have seen a significant drop in the sales turnover mirroring the drop of the general economy.

### *Market size estimate*

Based on industry insights, it is estimated that the total domestic consumption of nylon tyre cord in India is about 110,295 MT valued at Rs. 3,190 Crore.

Exhibit -C-46: Market size estimate of tyre cord

	2012-13
<b>Domestic consumption Quantity (in MT)</b>	110295.00
<b>Value of domestic consumption (in Rs. crore)</b>	3190
<b>Exports of nylon tyre cord (in MT)</b>	2877.53
<b>Exports of nylon tyre cord (in Rs Crore)</b>	108.97
<b>Market size of nylon tyre cord (in MT)</b>	113172.53
<b>Market size of nylon tyre cord (in Rs Crore)</b>	3542.00

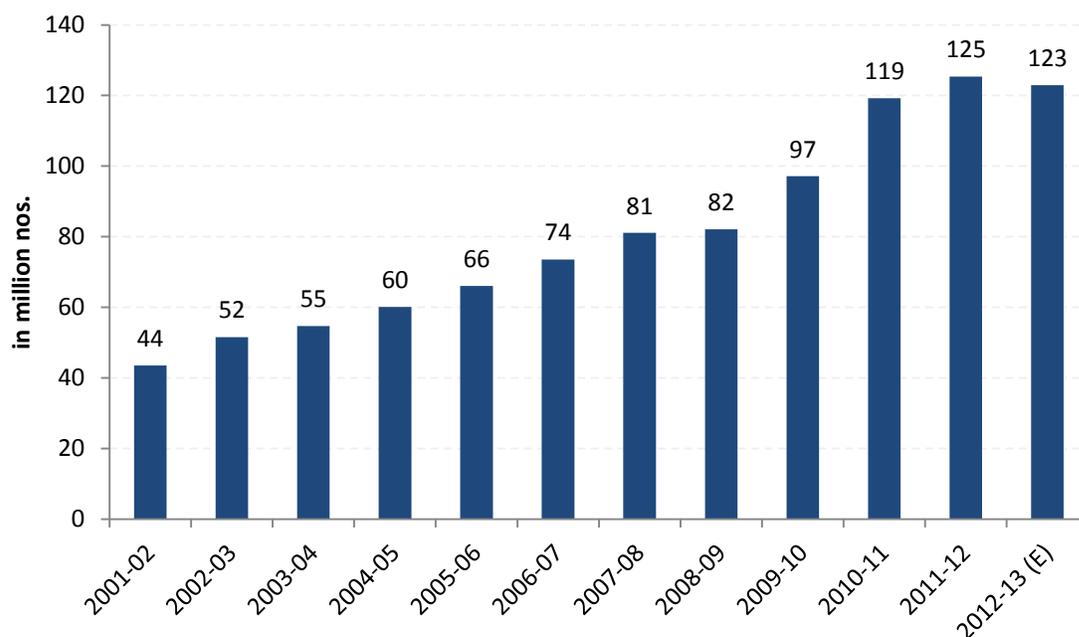
*\*source: IMAcS analysis, industry sources*

The market has grown at 10% per annum during the last five years in terms of value which is more on account of inflationary measures than real value growth. Thus, a truer indicator of the industry can be taken to be the quantity consumption where there has been a contraction.

### Key growth drivers and Inhibitors

The key growth driver for the nylon tyre cord industry is the tyre industry. The tyre production in India in the past year has seen a drop as opposed to healthy growth in the first half of the past decade.

Exhibit C-47: Tyre production in India



Source: ATMA, IMAcS Analysis

In accordance with the general trends of its consumer industry, the tyre cord consumption of India has grown over the years as reflected in its 4% growth but can assume better growth rates once the general economy and consumption is revived.

An emerging trend in the tyre industry is radialisation. The Passenger Car Radial (PCR) level is almost at 100% but the Truck and Bus Radial (TBR) level is way behind. The Indian Truck and Bus sector currently had a radialisation of 9-10% in 2012, but is expected to catch up at a much faster rate (Source: ICRA). A rise in radialisation will reduce the consumption of Nylon tyre record.

### Key Manufacturers

Nylon tyre cord fabric industry is a relatively well organised industry since the consumer tyre industry is a well organised industry too.

Major manufacturers of Nylon tyre cord include:

- SRF Ltd.
- Century Enka Ltd.

**Import export scenario**

Export of nylon tyre cord has seen a consistent rise over the last five years from 2007-08. There has been an increase in exports from Rs. 136 crore in 2007 – 08 from Rs. 352 crore, which displays a CAGR of 14%.

Exhibit-C-48: Import export trends of nylon tyre cord

Applicable HS family	HS code	HS codes	(2012-13)
<b>Exports</b>			
<b>5902</b>		59021010, 59022010, 59029010, 59021090, 59022090,	Rs. 108.97 crore

\*source: IMAcS analysis, industry sources, DGFT, line data

## Seat belt webbing

Seat belts function as a safety harnesses which secure the passengers in a vehicle against harmful movements during collision or similar incidents. Seat belts minimise injuries during accidents. Seat belts are woven narrow fabric made from nylon filament yarns or high tensile polyester filament yarn. The load specification is an important criterion for usage in vehicles.

### *Product Characteristics*

The seat belts are made from nylon filament yarn or polyester filament yarn which is woven to produce the webbing pattern. The linear density of synthetic yarns should be between 100dtex and 3000dtex, preferably 550-1800dtex. The filament linear density should be between 5dtex and 30dtex, preferably 8-20dtex. A typical seat belt is made of 320 ends of 1,100 dtex polyester each. Most weft yarns made from polyester are 550dtex. The critical characteristics of the webbing are abrasion resistance, resistance to light and heat, capable of being removed and put back in place easily and good retraction behaviour. The load bearing capacity of seat belts is 1500 kilograms. The surface of the webbing is of particular significance because its structure and properties decisively influence the retraction behaviour.

### Market size and trade trends

Based on industry survey and subsequent analysis, it is estimated that the total market size of seat belts in India is about 109 lakh units valued at Rs.300 crore. The seat belt webbing (the strap) is the technical textile in the complete seat belt assembly. The webbing is made of polyester or nylon. This technical textile composition of seat belts as indicated by our industry survey is about 40 to45%. Domestic consumption of seat belt webbing is estimated to be Rs. 119.98 Crore and with exports at Rs. 31.81 Crore the technical textile market for seat belt webbing is estimated at about Rs. 151.79Crore.

#### **Exhibit -C-49: Market size estimate**

	<b>2012-13</b>
Quantity of seat belts (in lakh units)	109 lakh units
Value of seat belts (in Rs. crore)	300
Domestic consumption of seat belt webbing (in million metres)	21.81
Value of domestic consumption of seat belt webbing (in Rs. crore)	131
Exports of seat belt webbing (in Rs. Crore)	31.81
<b>Market size of seat belt webbing (in Rs Crore)</b>	<b>151.7</b>

*\*source: IMAcS analysis, industry sources*

### Key growth drivers and Inhibitors

The key growth driver for is the four wheeler vehicles and hence, the growth of seat belts is slated to move in line with the growth in the four wheeler vehicles in India. This growth has taken quite a hit in the recent times with production slowing down considerably in the past two years.

Exhibit C-50: Automobile production trend

Automobile Production Trends(Number of Vehicles)					
Year	UVS	MPV	Passenger cars	Total (Cars + UV + MPV)	Y—o-Y growth of Production
2008	246,038	105,333	1,426,212	1777583	3.43%
2009	219,498	102,128	1,516,967	1838593	28.22%
2010	272,883	151,908	1,932,620	2357411	26.53%
2011	313,142	216,533	2,453,097	2982772	5.47%
2012	370,945	237,954	2,537,170	3146069	2.78%
2013	564,928	239,434	2,429,199	3233561	3.43%

Source: SIAM, IMaCS Analysis

In tandem with its consumer industry, the seat belt consumption and thus, the webbing consumption of India can grow only as fast as its main consumer - the four wheeler passenger vehicle production.

### Import export scenario

Both import and export of seat belt webbing has tabulated in Exhibit -C-51. The CAGR of exports at 39% is far ahead of the growth of imports at 8% from 2012-13 over 2008-09 albeit on account of a lower base.

Exhibit -C-51: Import export trends of seat belt webbing

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5806, 5911, 8708</b>	58062000, 58063200, 59119020, 59119090, 87082100, 87089900	Rs. 89.69 crore
<b>Exports</b>		
<b>5806, 5911, 8708</b>	58062000, 58063200, 59119020, 59119090, 87082100, 87089900	Rs. 31.81 crore

\*source: IMaCS analysis, industry sources, DGFT, line data

## Airbags

Airbags are inflatable protective equipment which reduces injuries during an accident or impact in coordination with the seat belt.

### *Product Characteristics*

The yarn / fabric generally used is nylon 66 or polyamide 66, lighter denier, lower dpf and silicone coated. We have assumed usage of 1.8 square meter of fabric per airbag module.

### Market size and trade trends

The domestic consumption of technical textiles in airbags in India is estimated to be Rs. 93.7 Crore and about 3.30 Mn Sqm. However, most of this consumption is met through imports of complete airbag assemblies. Export of airbag assembly stands at Rs 12.38 Crore, putting the market size at Rs. 106.15 Cr.

#### Exhibit-C-52: Market size estimate

	2012-13
Domestic consumption of airbags in India (in nos)	18,75,465
Domestic consumption of TT component of airbags (in Mn Sqm)	3.38
Value of Domestic consumption of TT component of airbags (in Rs. crore)	93.77
Exports of airbags (in Rs. Crore)	12.38
<b>Market size of airbags (in Rs. Crore)</b>	<b>106.15</b>

*\*source: IMAcS analysis, industry sources*

### *Key growth drivers and Inhibitors*

Consumption of airbags in India has still not caught up since the automotive market especially the four wheeler passenger vehicle market in India is very price sensitive. Airbag installation in cars pushes up the prices of a car significantly. Also, replacement of airbags after deployment implies similar cost. This being the case low-end cars and M&HCV / LCV commercial vehicles still do not have airbags. The airbags are typically fitted only in the high-end cars and higher end models of mid segment cars. Also, airbag installation in cars is not mandatory in India. Thus, the technical textile consumption of airbags has shot up in value fuelled by growth of number of high end/model vehicles. However, it has not resulted in expansion of domestic manufacturing capacity for the same, with most of this consumption met by imports which are cheaper than setting up manufacturing in India.

### **Import export scenario**

The import export scenario outlined here is for airbag (inclusive of airbag assemblies) and thus, represents value of airbag assemblies rather than technical textile of the airbags only. Both import and export of nylon tyre cords have seen a spectacular rise over the last five years from 2007-08. While imports have risen substantially from Rs. 129 crore to Rs. 440 crore at a CAGR of 28%, there has been an increase in exports from Rs. 0.97 crore to Rs. 12 crore, which displays a steep CAGR of 66% on account of a lower base effect.

**Exhibit-C-53: Import export trends for airbags**

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>8536, 8543, 8708, 9401</b>	85369030, 85437029, 85437099, 87082900, 87089500, 87089900, 94019000	Rs. 439.89 crore
<b>Exports</b>		
<b>8536, 8543, 8708, 9401</b>	85369030, 85437029, 85437099, 87082900, 87089500, 87089900, 94019000	Rs. 12.38 crore

*\*source: IMAcS analysis, industry sources, DGFT, line data*

### **Quality Standards**

There are no Indian standards.

## Car upholstery: Seat cover fabrics

Car seat cover(s)/fabric are one of the largest segments of Mobiltech accounting for as much as about 12% of the mobiltech in value terms. With rising income levels and growing popularity of four wheelers amongst Indian families, consumption of seat cover fabrics in India has seen an expected rise. However, the recent slowdown in automotive sector has prevented a full throated growth of this segment.

### Market size and trade trends

The market size of car seat covers is estimated at Rs. 856.10 Crore. Domestic consumption of seat covers is estimated to be Rs. 854.15 Crore and 443.71 Lakh linear metres which is up from the estimates of 2007-08 of Rs. 402 Crore and 146.8 Lakh metres growing at a healthy CAGR of 16%. Exports for seat covers contribute Rs. 1.95 Crore to the market size.

Exhibit-C-54: Market size estimate

	2012-13
<b>Domestic consumption of seat cover fabrics (in Lakh of linear metres)</b>	443.71 Lakh
<b>Value of Domestic consumption of seat cover fabrics (in Crore)</b>	854.15
<b>Exports of seat cover fabrics (in Rs Crore)</b>	1.95
<b>Market size of seat cover fabrics (in Rs Crore)</b>	856.10

\*source: IMaCS analysis, industry sources

### *Key growth drivers and Inhibitors*

Seat cover market is essentially driven by two components – new car seat sales comprising demand from newly manufactured vehicles and replacement market. The break of this market as per these drivers is given below.

Exhibit-C-55: Contribution of car seat cover sales from new and replacement market for 2012-13

Contribution of car seat cover sales from new and replacement market for 2012-13	
<b>New Car seat covers market</b>	2012 -13
<b>Qty of seat cover fabrics (in Lakh of linear metres)</b>	251.17 Lakh
<b>Value of seat cover fabrics (in Crore)</b>	483.50
<b>Replacement Car seat covers market</b>	2012 -13
<b>Qty of seat cover fabrics (in Lakh of linear metres)</b>	192.54 Lakh
<b>Value of seat cover fabrics (in Crore)</b>	370.64

\*source: IMaCS analysis, industry sources

The new car seat sales are directly dependent upon the production of passenger vehicles in the country.

### **Key Manufacturers**

Key manufacturers include:

- Shamken Multifab
- Bhilwara Melba
- Krishna Maruti

### **Import export scenario**

The import export scenario for seat covers has been captured in the Exhibit-C-56.

Exhibit-C-56: Import trends

Applicable family	HS code	HS codes				(2012-13)
<b>Imports</b>						
<b>3926, 5903, 6304, 6307, 8708, 9401</b>		39262029,	39269029,	39269099,	39269099,	Rs. 263.64 crore
		59032090,	59039090,	63049291,	63079090,	
		87082900,	87089900.	94012000.	94018000,	
		94019000				
<b>Exports</b>						
<b>3926, 5903, 6304, 6307, 8708, 9401</b>		39262029,	39269029,	39269099,	39269099,	Rs. 1.95 crore
		59032090,	59039090,	63049291,	63079090,	
		87082900,	87089900.	94012000.	94018000,	
		94019000				

\*source: IMAcS analysis, industry sources, DGFT, line data

## Car body covers

Car body covers are used to provide protection to vehicles against weather agent especially if no covered space for parking (parking garage) is available.

### *Product Characteristics*

The car body cover is a 100% technical textile product based on the raw material used. The car body covers are made of a variety of fabrics including canvas covers, HDPE, PVC reinforced cotton material and Nylon. Typically, price of a car body cover ranges from Rs. 600 to upward of Rs. 2000 for larger cars.

### Market size and trade trends

#### *Market size estimate*

The domestic consumption of car body covers is estimated to be Rs 47.09 Crore and 784,872 units up from Rs. 9 crore and 1.04 lakh units. Since, exports for the same is insignificant, we assume the same to be the market size for car body covers.

Exhibit-C-57: Market size estimate of car body cover

	2012-13
<b>Market size of car body cover (in lakh nos)</b>	7.85 Lakh nos
<b>Value of car body cover (in Crore)</b>	47.09

\*source: IMAcS analysis, industry sources

#### *Key Manufacturers*

Car body covers is a market dominated mostly by unorganised sector and a multitude of small players.

#### *Import export scenario*

The imports and exports against car body covers are negligible.

## Automotive carpets

All passenger cars have company fitted carpets. The carpets are laid in the cabin and parcel shelf at the back. The carpets are primarily non-woven textile material. The usage of carpets varies based on the interior designs which vary across car models. Usage of carpets in buses and other M&HCVs is minimal.

### *Product Characteristics*

The automotive interior carpets are non-woven technical textiles, made primarily from polypropylene fibres. The carpet is laid on the vehicle floor above which rubber mats are placed. The desired characteristics of automobile interior carpets typically are as given below:

1. High durability
2. High abrasion resistance
3. Tensile strength – warp around 50 KGF and weft around 45 KGF
4. Low in-flammability
5. Good compression recovery

The fabric is around 500 GSM with a thickness of about 3mm.

### Market size and trade trends

#### *Market size estimate*

Exports for automotive interior carpets are negligible. The domestic consumption and thus, market size of automotive carpets is estimated to be Rs. 353.49 Crore and 25.35 Mn Sqm up from 13.6 million sq. m. and Rs 136 Crore from 2007-08 growing at a CAGR of 21.05%.

Exhibit-C-58: Market size estimate of automotive interior carpets

	2012-13
Quantity of automotive carpets (in Mn Sqm)	25.35
Value of seat cover fabrics (in Rs. Crore)	353.49

\*source: IMAcS analysis, industry sources

### **Key growth drivers and Inhibitors**

Key growth driver of automotive carpets is the passenger vehicle segment that has been growing over the horizon of past ten years but is seeing a slowdown in the current economic scenario. It is this segment that is the chief consumer of the product and thus, the key driver.

### **Key Manufacturers**

The major producers of carpets in India include:

- Uniproducts India,
- Bajaj Carpets,
- Hitkari Fibres and
- Supreme Non-wovens

### **Import export scenario**

The import export scenario for automotive carpets has been captured in the table below. Imports stand at a value of Rs 9.36 crore and exports are insignificant amount of the total trade.

Exhibit-C-59: Import trends automotive interior carpets

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>3918, 3926, 4016, 5705, 8708</b>	39181090, 39269099, 40169100, 40169990, 57050090, 87089900	Rs. 9.36 crore
<b>Exports</b>		
<b>3918, 3926, 4016, 5705, 8708</b>	39181090, 39269099, 40169100, 40169990, 57050090, 87089900	--

\*source: IMAcS analysis, industry sources, DGFT, line data

### **Machinery details**

The automotive interior carpets are non-woven (needle-punched) technical textiles, made primarily from polypropylene fibres.

The needle punching machine is imported from Austria, Taiwan and China

1. Oerlikon Neumag GmbH, Austria – Fehrer needle punching technology
2. Shoou Shyng, Taiwan- SPL-03+SVP

## Headliners

Headliners are used in passenger cars and multi/sports utility vehicles as non-woven light weight roofing material. The cars were earlier fitted with knitted/woven fabric with hard cardboard type of backing. The trend has changed and increasingly non-woven headliners are being used in vehicles.

### *Product Characteristics*

A headliner is a composite material that consists of a face fabric with nonwoven or foam backing that is adhered to the inside roof of automobiles. Most headliners consist of a tricot knit fabric that is knapped to provide a soft touch and uniform appearance. The fabric is adhered with melted polyurethane foam. This fabric-foam composite is glued to the interior fiberglass roof of the automobile.

Headliners non-woven fabrics have GSM in the range of 185-220 GSM. The desired characteristics of headliners are good sound damping properties and good aesthetics. The manufacturing process and material used varies across manufacturers and as per OEM specifications.

### Market size and trade trends

#### *Market size estimate*

The market size (domestic consumption) of headliners is estimated at Rs. 77.62 Crore and 8.40 Mn Sqm up from 4.41 Mn Sq. and Rs 28.70 Crore in 2007 – 08 growing at a CAGR of 22.05%. Exports for the product are negligible.

Exhibit-C-60: Market size estimate of headliner

	2012-13
<b>Market size of headliner (in Mn Sqm)</b>	8.40
<b>Market size of headliner (in Crore)</b>	77.62

*\*source: IMAcS analysis, industry sources*

#### *Key growth drivers and Inhibitors*

Key growth driver of automotive carpets is the passenger vehicle segment that has been growing over the horizon of past ten years but is seeing a slowdown in the current economic scenario. It is this segment that is the chief consumer of the product and thus, the key driver.

### **Key Manufacturers**

The major producers of automobile headliners in India include:

- Krishna Maruti
- Multivac India

### **Import export scenario**

The import export scenario for headliners has been captured in the table below. Imports stand at a value of Rs 11.86 crore and exports are a negligible amount of the total trade.

**Exhibit-C-61: Import trends of headliner**

Applicable HS family	HS code	HS codes	(2012-13)
<b>Imports</b>			
<b>5603</b>		56039400	Rs. 11.86 crore
<b>Exports</b>			
<b>5603</b>		56039400	--

*\*source: IMAcS analysis, industry sources, DGFT, line data*

### **Machinery details**

Typically the headliners are non-woven technical textiles made of PSF, polypropylene or polyurethane core sprayed between two reinforcing layers. Needle loom is the key machinery for manufacturing headliners non-woven. The needle looms are generally imported. One of the most famous needle punch machine manufacturers in the world is Dilo (Germany).

## Insulation Felts

Insulation felts, often known as NVH products (Noise, Vibration, and Harshness parts) are used for acoustic and thermal insulation in the automobiles. These are Bonnet liner, Outer dash, Wheelhouse, and Outer floor under shield. These parts not only provide noise protection inside the car but also a reduction in the noise emission outside. Uses of NVH parts in automobiles started after introduction of EURO norms in the sector.

### *Product characteristics*

The NVH products or insulation felts are 100% polyester non-woven technical textile products. These products are classified based on the manufacturing process as needle-punched, phenolic resin bonded and thermoplastic. The felts are generally soft and used with or without harder backing. The thermal insulation products provide dissipation of heat at high temperature areas in the engine and under car body. The NVH products combine noise and heat protection function into the integrated comfort system.

### Market size and trade trends

#### *Market size estimate*

Exports for insulation felts are negligible and thus the domestic consumption in itself constitutes the market size for insulation felts. The domestic consumption of insulation felts is estimated to be Rs. 612.13 Crore and 41, 825 MT up from Rs 232Crore and 22,500 MT in 2007 – 08 growing at a CAGR of 21%.

Exhibit-C-62: Market size estimate of insulation felts

	2012-13
<b>Market size of insulation felts (in MT)</b>	41,825
<b>Value of Market size insulation felts (in Crore)</b>	612.13

#### *Key growth drivers and Inhibitors*

Key growth driver of automotive carpets is the passenger vehicle segment that has been growing over the horizon of past ten years but is seeing a slowdown in the current economic scenario. It is this segment that is the chief consumer of the product and thus, the key driver.

### **Key Manufacturers**

The major producers of insulation felts are Uniproducts India and Supreme Treves Pvt. Limited, a group company of Supreme Non-woven.

### **Import export scenario**

The import export scenario for insulation felts has been captured in the table below. Imports stand at a value of Rs 2.57 crore and relevant exports are insignificant.

**Exhibit-C-63: Import trends of insulation felts**

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5602, 7019</b>	56021000, 56022910, 56022990, 56029090, 70199010	Rs. 2.57 crore
<b>Exports</b>		
<b>5602, 7019</b>	56021000, 56022910, 56022990, 56029090, 70199010	--

*\*source: IMAcS analysis, industry sources, DGFT, line data*

### **Machinery details**

The machinery used for manufacturing NVH components is primarily imported. The details are as given below:

1. Opening and Blending machine – (Key supplier - Reisky and Schlese)
2. Needle Loom – (Key supplier - Dilo (Germany))
3. Foaming and Moulding machine
4. Lamination machine
5. Resin felt manufacturing machine
6. Thermo-bond interlining manufacturing machine

## Sunblind/sun visors

The sunvisors are located in the interiors of a four-wheeler just above the windshield. The sunvisors are used to block the light from the sun from entering through the windshield. The blinds can also be turned to the front side window to reduce lateral sun exposure. There are two sunvisors in a car, one for driver and the other for the co-passenger. However, the high end car models have up to four sunvisors.

### *Product Characteristics*

Sun visor needs to effectively reduce the sun obstruction to the driver and passenger. Nowadays, a small mirror is also fitted on one of the two sun visors (on one side). The blinds are primarily made of three parts, the synthetic backbone made of polypropylene or kenaf fibres, scrim – coarse woven reinforcement fabric and upholstery – typically artificial leather

### Market size and trade trends

#### *Market size estimate*

The domestic consumption of sunvisors is estimated to be Rs 146.91 Crore and 8.11 million nos growing at CAGR of 14% from Rs. 74 Crore in 2007-08. A good part of this consumption is catered to by imports as can be seen from the numbers in the export import section. Since exports for sunvisors are negligible we can assume the market size to be the same as the domestic consumption.

#### **Exhibit-C-64: Market size estimate**

	2012-13
<b>Market size of sunblinds(in mn nos)</b>	8.10
<b>Value of Market size of sunblinds (in Crore)</b>	146.91

*\*source: IMAcS analysis, industry sources*

### *Key growth drivers and Inhibitors*

Key growth driver of automotive carpets is the passenger vehicle segment that has been growing over the horizon of past ten years but is seeing a slowdown in the current economic scenario. It is this segment that is the chief consumer of the product and thus, the key driver.

### *Key Manufacturers*

The key manufacturers of automobile sun blinds are:

1. Krishna Grupo Antolin Pvt. Ltd., Pune
2. Mayur Industries Ltd., Haryana

3. The Krishna Polymer Technologies, Noida

**Import export scenario**

India's imports for sunblinds stand at about Rs. 19.5 Crore. India has negligible exports for sunblinds.

Exhibit-C-65: Import trends

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>3926, 6303, 8708</b>	39269099, 63031200, 87089900	Rs. 19.5 crore

\*source: IMAcS analysis, industry sources, DGFT, line data

## Helmets

Helmets are used as protective headgear for two wheelers. The typical motorcycle helmet has an inner layer of polystyrene or polypropylene foam and an outer layer made of plastic, glass, and other synthetic fibres. The chief purpose of a helmet is to absorb the impact of a crash and thus prevent primary injury to the brain, rather than preventing skull and face fractures. The outer shell prevents sharp objects from puncturing the skull and also protects the inner liner upon contact with the road. The inner foam lining is crushed following impact, thereby increasing the stopping time and distance of the helmet. This, in turn, limits the accelerative forces on the brain, reducing the chance of primary brain injury. The helmet consumption is mainly driven by the sales of two wheelers in the country. It also has replacement consumption.

### *Product Characteristics*

The two types of helmets available are:

1. Full face helmet
2. Open face helmet

The critical characteristics of the helmets are -- protection of head, clear vision through the visor, quick release chin strap and appropriate ventilation (in case of full face helmets). The outer shell is made from Acrylonitrile-Butadiene-Styrene (ABS) or Polypropylene or glass fibre plastic which is hard in nature. The inner side of the shell is expected to provide cushion to the rider and is made from regulated density concussion padding.

### Market size and trade trends

#### *Market size estimate*

The domestic consumption for helmets is estimated to be at Rs 1,014.59 Crore and 28.18 million units growing at a CAGR of 32% from Rs. 250 Crore and 16.7 million nos. Since, there are no exports of helmets, we assume this to be the market size of helmets in India.

Exhibit-C-66: Market size estimate for helmets

	2012-13
<b>Market size of helmets(in mn nos)</b>	28.18 mn nos
<b>Value of Market size of helmets (in Crore)</b>	1014.59

\*source: IMaCS analysis, industry sources

### **Key growth drivers and Inhibitors**

The key growth driver for the market of helmets is the sale of two wheelers in India. The growth of sales in two wheelers has somewhat moderated over the period of last five years as can be seen from Exhibit C-67: Sale of two wheelers in India and corresponding year-on-year growth. This effect can be seen in the number wise consumption which has grown only at about 3% from 2007 -08. A good growth in the market size of helmets can be expected only with a revival of the two wheelers consumption.

Exhibit C-67: Sale of two wheelers in India and corresponding year-on-year growth

Year	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Sale of Two Wheelers	7,249,278	7,437,619	9,370,951	11,768,910	13,435,769	13,797,748
Y-o-Y growth		2.60%	25.99%	25.59%	14.16%	2.69%

Source: SIAM. IMAcS Analysis

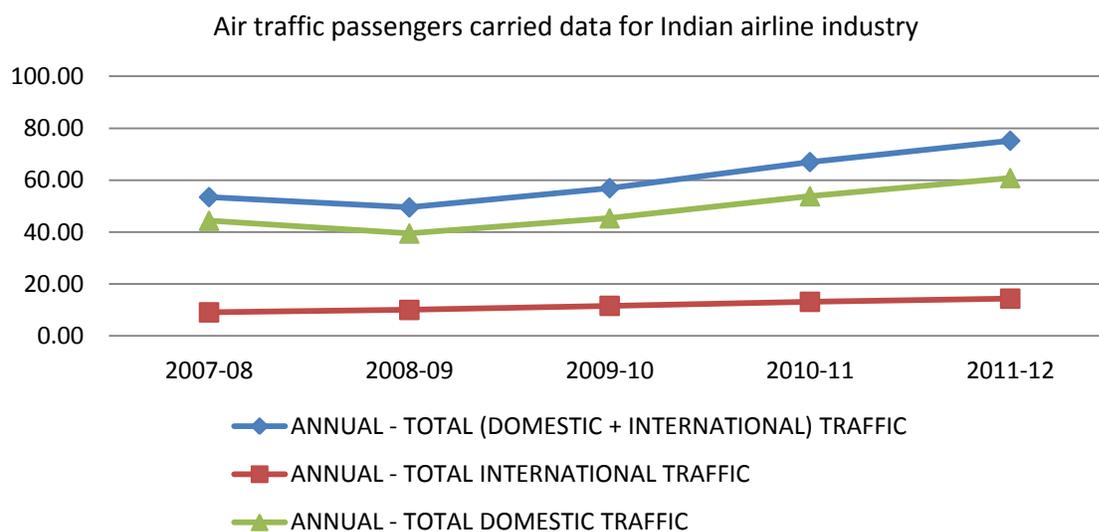
### **Key Manufacturers**

Various international players like KBC (price range from Rs 3,600 to Rs 11,500) and Sparx (price range from Rs. 3,600 to 5,600) are already present in India. The famous Indian brands of helmets are Spark, Wrangler, Steelbird and Fasttrack which has joined this club recently.

## Usage of technical textiles in airlines industry

The scope of the Indian aviation industry has changed drastically in the period of past five years from a comparison horizon of last ten years. Where the domestic traffic grew to about 70 million in 2006-07 at a CAGR of 30% over the period 2004 to 2007, it has stagnated substantially over the last five years. As can be seen from the DGCA passenger traffic data, airlines have more or less stagnated over the period of past five years.

Exhibit C-68: Indian Air traffic (passengers carried data) for the past five years



Source: DGCA

Accordingly challenges such as, elevated fuel prices over coupled with intense competition and unfavorable foreign exchange environment has again deteriorated the financial performance of airlines. Price Sensitive traveller base which again adds to the woes of the airlines industry in India (Source: ICRA). A stagnation or slowdown in this consumer industry accordingly ripples through into the demand for technical textiles products for the industry.

Technical textile products used in India include airlines disposable, headrest covers, webbings in aircraft seat belt and upholstery for aircrafts. The domestic production of these technical textiles shall be updated pending meetings with industry player active in the relevant space. However, the imports against these products which are a critical component with significant share have been tabulated in the exhibits below.

Interim report on Baseline Survey of Technical Textiles in India 2013

Exhibit-C-69: Import trends

Product	Applicable code family	HS	HS codes	(2012-13)
<b>Imports</b>				
<b>WEBBINGS - PARTS FOR AIRCRAFTS</b>	5407, 5902		54073090, 59022090	Less than Rs. 0.1 Crore
<b>UPHOLSTERY – AIRCRAFT MATERIAL</b>	5112, 5403, 9401		51121990, 54034990, 94011000, 94019000	Rs 75.91 Crore
<b>AIRCRAFT HEADREST COVERS</b>	4811, 4818, 6302, 6304		48114100, 63022200, 63049230, 48189000, 63029900, 63049300	Rs. 0.76 Crore

\*source: IMaCS analysis, industry sources, DGFT, line data

## Usage of technical textiles in railways

### The Indian Railways

The Indian Railways is an over than 150 years old, one of the largest rail networks in the world, has contributed significantly to the economic growth and the transport needs of the country. The developmental role of the railways is particularly important in the context of both passenger and freight sectors. In 2011, Indian Railways carried 21 million passengers and 2.54 million tonnes of freight traffic daily over its 64,460 kilometre network.

The key Indian Railways statistics are as given below:

**Exhibit-C-70: Statistics of railways**

Particulars	2011 Figures
Route Length	64,460 kms
Locomotives	9,213
Passenger Service Vehicles	53,220
Other coaching vehicles	6,493
Wagons	229,381
Railway Stations	7,133

Source: Indian Railways Year Book 2011

Key technical textile item used by the railways is the seat covers used to furnish our coaches.

### Railways seat cover fabric

In Railways, the material for seat berths fabric is the key technical textile usage. Material used in the berths is polyurethane foam and rexine cloth.

### *Product characteristics*

Rexine material is used in railway seat covers. The rexine material is constructed from single or multiple poly vinyl film layers with choice of backing cloth. Synthetic cloth like polyester and rayon is used. The rexine material is fire retardant coated fabric.

## Market size and trade trends

### *Market size estimate*

The railway seat cover fabric consumption is estimated to be Rs. 1.05 crore and 351,292 Mn Sqm of rexine used in seat covers. The fundamental unit of consumption of seat cover in railways would be the number of berths. The approximations and estimations used in arriving at the market size have been tabulated in Exhibit-C-71.

**Exhibit-C-71: Market sizing of seat cover fabrics in railways**

RCF Data	Berths/Coach	2012-13
Non-AC	72	937
AC	55	225
Total Coaches	-	1162
Non-AC Berths	-	67464
AC Berths	-	12375
Total Berths	-	79839
Rexine (Quantity sq. m.)	4.4 sq.m /berth	351291.6
Rexine (Value in Rs crore)	Rs. 34.5 /sq. m.	1.21

## 4. Packtech

Packtech, is the segment of technical textiles that includes various packaging materials ranging from polymer based bags used for industrial packing to jute based sacks used for packaging food grains and packaging used for tea.

The technical textile products covered under Packtech are as give below:-

- Polyolefin Woven Sacks (excluding FIBC)
- FIBC
- Leno bags
- Wrapping fabric
- Jute Hessian and Sacks (including Food grade jute bags)
- Soft luggage products (TT component)
- Tea-bags (filter paper)

The market size for the Packtech has been captured in **Error! Reference source not found..**

Exhibit C-72: Market sizing of Packtech

	2012-13				
	(All figures in Rs. Crore)				
	Production	Imports	Exports	Domestic Consumption	Market size
Polyolefin woven sacks (excluding FIBC)	9008	42	323	8726	9050
FIBC	3200	9	1542	1667	3209
Leno bags	800	—	6	794	800
Wrapping fabric	2150	—	—	2150	2150
Jute hessian sacks (including food grade jute bags)	10665	—	1157	9592	10750
Soft luggage (TT component)	365	115	14	480	494
Tea-bags filter paper	503	39	0	543	543
<b>Total</b>	<b>26692</b>	<b>205</b>	<b>3042</b>	<b>23953</b>	<b>26995</b>

Technical textiles market size under Packtech is estimated at around Rs 26,992 Crore. Jute hessian and sacks (including Food grade jute bags) account for around 40% of this followed by PP Woven sacks (excluding FIBC) with around 34% share. FIBC and wrapping fabrics account for around 20% of the total usage. Usage of technical textiles in soft luggage products, leno bags and tea-bags is little less than 7% of the total usage in Packtech.

Exports of Packtech products (technical textiles component) from India have been estimated at almost Rs 3042 crore. Imports are a much smaller percentage at about Rs. 205 Crore.

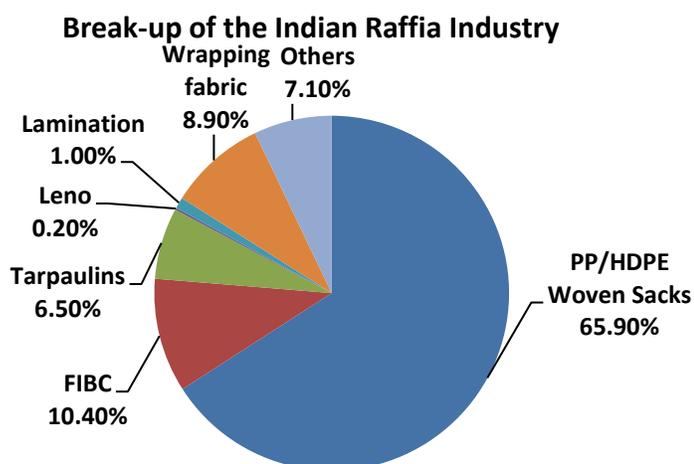
The domestic consumption of technical textiles under Packtech is expected to increase only by about 7 – 8% optimistically.

## **Indian Raffia Industry**

The Raffia Industry can be categorized into six main categories depending upon the type of woven bag made. They are namely:

- Polyolefin Woven Sacks (excluding FIBC)
- Flexible Intermediate Bulk Containers (FIBC)
- Tarpaulins
- Leno bags
- Lamination
- Wrapping fabric
- Others

Exhibit C-73: Break-up of Raffia industry



Source: Industry reserach, IMAcS Analysis

For around 50% of the applications above, Polypropylene (PP) is used exclusively (cement, etc.). For around 7.5% applications, (Polymer, lamination etc.), Poly Ethylene (PE) is used. The remaining 42% is an overlap of PP & PE where either can be used (Fertilizer, wrapping fabric, chemicals, cattle feed, food grains, sugar etc). Indian Raffia industry is estimated to grow at 5-6%.

The current market estimates of Raffia industry is given below:-

Exhibit C-74: Market size estimate of Raffia Industry

	2012-13
<b>Quantity (in MT)</b>	1.40 Million MT
<b>Value (in Rs. crore)</b>	Rs. 18,200 Crore

\*source: IMAcS analysis, industry sources

### Key manufacturers

Though the Raffia industry is spread all over India, it is mainly concentrated around the region which has major fertilizer and cement players like the states of Gujarat, Maharashtra, Punjab, Rajasthan, Karnataka, MP and Tamil Nadu. Though there are several small scale units, there are a few big players with capacity as high as 36,000 MT per annum. Thus the player size ranges from 200 MTPA to 36,000 MTPA with average size of about 300 MTPA taking into account all players of the industry and its total capacity.

Exhibit C-75: Revenue of key manufacturers

Manufacturer	Year	Sales of company (Rs Crore)
Jai Corp Ltd.	2012 - 13	634.34
Neo Corp International Ltd.	2012 - 13	424.23
Bajaj Steel Industries Ltd.	2012 - 13	285.23
Narendra Plastic Pvt. Ltd.	2012 - 13	284.23
Flexituff International Ltd.	2012 - 13	863.35
Ashok Polymers Ltd.	2012 - 13	99.62
KG Petrochem Ltd.	2012 - 13	97.05
Texplast Industries Ltd.	2012 - 13	89.46
Polyspin Exports Ltd.	2012 - 13	82.55
Marvel Industries Ltd.	2012 - 13	66.51
Mewar Polytex Ltd.	2012 - 13	44.07
Rishi Techtex Ltd.	2012 - 13	35.53
Pankaj Polymers Ltd.	2012 - 13	31.25
Gujarat Raffia	2012 - 13	27.59
Deccan Polypacks Ltd.	2012 - 13	23.24
Karnavati Alfa International Ltd.	2012 - 13	5.49
Promact Plastics Ltd.	2012 - 13	3.66

Source: Capitaline, Annual reports, Company Websites, Industry survey

## Polyolefin Woven Sacks (excluding FIBC)

Polyolefin (HDPE/PP) woven sacks are versatile packing materials used extensively in the packing of cement, fertilizers, thermo plastic raw materials, food grains, sugar etc. The list of user-industries where they are used is:

1. Cement
2. Fertilizers
3. Chemicals
4. Food Grains
5. Cattle Feed
6. Salt
7. Sugar
8. Polymers
9. Sacks - Export
10. Others

### Product Characteristics

Exhibit C-76: Product characteristics

HDPE Bag Capacity	Weight of the HDPE Bag (100% TT)
50 kgs	110 – 116 grams

Source: Industry survey, IMAcS Analysis

Cement bags on an average weigh 70g and fertilizer bags 130g.

Exhibit C-77: Woven bag details

WOVEN BAG FABRIC DETAILS				
Material	PP / HDPE			
Fabric Weave	5x5 to 14x14 per sq. in. OR 20x20 to 56x56 per sq. dm.			
Tape Specification	Standard	2.5	mm.	width.
	Denier: 500 D to 2000 D			

<b>Fabric Colour</b>	Natural, Milky or coloured
<b>Additives</b>	Ultra Violet Stabilized. TiO <sub>2</sub> , CaCO <sub>3</sub> or antislip coated or as specified.
<b>Lamination</b>	Laminated or Unlaminated
<b>APPLICATIONS</b>	Fertilizers, Cement, Sugar, Food grains, Salt, Flour, Cattle Feed, Seeds, Sand, Chemicals

The various advantages that HDPE/PP bags have conventional packing materials are:

- Higher Strength
- Light Weight
- Minimal Seepage
- Moisture Proof
- Long Lasting (Durable)
- Cheaper (as it can be reused)

### Market size and trade trends

#### *Market size estimate*

The domestic consumption of market size for Polyolefin sacks is estimated to be Rs. 8726.28 Crore and 671.25 KT up from Rs 6,725 crore at 2007 – 08 growing at a CAGR of 5.35%. Exports for the same are at Rs. 323.23 Crore which bring the market size to Rs. 9049.51 Crore.

	2012-13
Quantity of domestic consumption (in KT)	671.25
Value of domestic consumption(in Rs. crore)	8726.28
Value of exports (in Rs. crore)	323.23
<b>Market size of exports (in Rs. crore)</b>	<b>9049.51</b>

### ***Key growth drivers and Inhibitors***

The market for polyolefin woven sacks would track the growth of these driver industries chiefly cement and fertilizers which are the biggest consumers of polyolefin sacks both put together nearly at 50% .

### **Impediments to growth**

This industry is highly sensitive to the prices of HDPE/PP granules which are its key raw materials constituting about 60% of the total input. With the prices of polymer granules increasing sharply, the woven sack manufacturers are finding it increasingly difficult to maintain competitive prices of their bags. To maintain the prices, the percentage of 'Filler' material being used is increasing. Increased usage of filler brings the cost of the bag down but the strength and the quality is also lowered. To protect the interest of the end users of these woven sacks Government of India plans to setup a limit up to which fillers can be used for every end user segment. This will significantly increase the price of a HDPE bag.

### ***Key Manufacturers***

Key manufacturers in the polyolefin sacks industry are:

- Asia Pack
- Ganpati Plastfab
- Gopala Polyplast
- Guj. Raffia Inds
- Jumbo Bag
- Kanpur Plastipa.
- Karur KCP Pack.
- KG Petrochem
- Mewar Polytex
- Neo Corp Intern
- Pankaj Polymers
- Pankaj Polypack
- Pithampur Poly
- Planter's Poly
- Polyspin Exports
- Promact Plastics

- Rishi Tech.
- Salguti Industri
- Sh. Jagdamba Pol
- Stanpacks(India)
- Texel Inds.
- Texplast Inds.
- TPI India

Besides the leading ones mentioned above, there are various other players spread across the country.

### ***Import export scenario***

The import export scenario for polyolefin sacks is captured in Exhibit C-78 below.

**Exhibit C-78: Import Export trends for polyolefin sacks industry**

HS family	code	Applicable HS codes	2012-13
<b>Imports</b>			
<b>3923, 6305</b>	<b>3926,</b>	39231010, 39232100, 39239090, 39261099, 39269080, 63051090, 63053300, 63053900	Rs. 41.53 crore
<b>Exports</b>			
<b>3923, 6305</b>	<b>3926,</b>	39231010, 39232100, 39239090, 39261099, 39269080, 63051090, 63053300, 63053900	Rs. 323.23 crore

*\*source: IMAcS analysis, industry sources*

### **Machinery details**

The main machine required for woven sacks manufacturing is the Shuttle Loom. The main suppliers of these looms in India are:

- Lohia Starlinger Limited
- J. P. Industries
- Kabra Extrusiontechnik Ltd. (KET) – Kolsite
- Windsor Machines Limited

### **Quality Standards**

- IS 6899:1997 Textiles - High density polyethylene (HDPE) woven fabrics

*Interim report on Baseline Survey of Technical Textiles in India 2013*

- IS 8069:1989 High density polyethylene (HDPE) woven sacks for May packing pesticides [amalgamating IS 8069(Part 2):1981]
- IS 9755:2003 Textiles - High density polyethylene (HDPE)/Polypropylene (PP) woven sacks for packing fertilizers
- 9 IS 11652:2000 Textiles - Woven sacks for packing cement - High density polyethylene/ Polypropylene
- IS 12100:1987 High density polyethylene (HDPE) woven sacks for packing flour
- IS 14252:2003 Textiles -High Density Polyethylene (HDPE)/Polypropylene (PP) woven bags for filling sand
- IS 14887:2000 Textiles - High density polyethylene (HDPE)/ polypropylene (PP) woven sacks for packing food grains
- IS 14968:2001 Textiles - High density polyethylene (HDPE)/polypropylene (PP) woven sacks for packing 50 kg/25 kg sugar

## Flexible Intermediate Bulk Containers (FIBCs)

Flexible Intermediate Bulk Containers (FIBC), popularly known as “Jumbo Bags”, is similar to the HDPE/PP bags but that of a larger size. FIBC’s are one of the most cost effective and ideal types of packaging for shipping and storing dry bulk products. They can be produced from either tubular or flat polypropylene (PP) woven fabrics. These fabrics can be coated or uncoated and vary in terms of weights depending upon the requirements of the Safe Working Load (SWL), or Safety Factor (SF).

There are three types of FIBC bags

- Panel Type
- Circular woven
- Baffle type (Square bags)

### *Product Characteristics*

The general bag specifications used in the industry are as follows:

**Exhibit C-79: Specifications of FIBC bags**

Capacity (cubic feet)	Empty size width (inches) X depth (inches)	Filled diameter (inches)	Applications
5 to 20	29 X 29 to 31 X 31	38	For higher bulk density products or smaller weight requirements
21 to 75	35 X 35 to 37 X 37	46	Most common sizes for all products. Used in truck shipments and export containers
76 and above	41 X 41 to 43 X 43	53	For smaller bulk density products or where height restrictions occur. Used for rail shipments

In general the approximate weight of FIBCs is as follows:

**Exhibit C-80: Weight of FIBC bags**

Type of bag	Weight in grams
Builder bag	900-1200
Technical bag	1800-2200
Speciality bag	1800-2400

**Exhibit C-81: TT component in FIBC**

FIBC Bag Capacity	Weight of the FIBC Bag (100% TT)
500 kgs	1-2 kg

Source: Industry survey, IMAcS Analysis

These bags have capacities ranging from 500-4000 kgs. The weight of fabric varies from 180-275 gsm. FIBCs can vary from 900 gms to 3 kgs in weight depending upon the bag properties and weight to be carried.

**Market size and trade trends**

***Market size estimate***

The market for FIBC containers is estimated to be at Rs. 3,208.63 Crore and 200.18 KT. Domestic consumption of FIBC in India is estimated to be at about 190.54 KT and exports to be at 9.63 KT.

**Exhibit C-82: Market size estimate of FIBC**

	2012-13
<b>Domestic consumption of FIBC(in KT)</b>	190.54
<b>Value of domestic consumption of FIBC(in Rs. Crore)</b>	1667.04
<b>Exports of FIBC<sup>5</sup> (in KT)</b>	9.63
<b>Value of exports of FIBC<sup>5</sup> (in Rs. Crore)</b>	1541.59
<b>Market size of FIBC (in KT)</b>	200.18
<b>Value of market size of FIBC (in Rs. Crore)</b>	3208.63

\*source: IMAcS analysis, industry sources

***Key growth drivers and Inhibitors***

Consumption of FIBCs by various industries esp. Key consumer like soda ash industries also depends a great deal on how well the industry is equipped to handle FIBC since handling of these FIBCs requires special equipment. This has grown at a CAGR of 7%.

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<sup>5</sup> Exports numbers are inferred from industry sources

**Import export scenario**

The imports and exports of FIBCs are captured in the exhibit below.

Exhibit C-83: Import export trends for FIBCs

HS code family	Applicable HS codes	2012-13
<b>Imports</b>		
<b>3932, 6305</b>	39232990, 39239090, 39269080, 63051030, 63053200, 63053900	Rs. 8.63 crore
<b>Exports</b>		
<b>3932, 6305</b>	39232990, 39239090, 39269080, 63051030, 63053200, 63053900	Rs.1541.59 crore <sup>5</sup>

**Machinery details**

The main machine required for FIBC manufacturing is the Shuttle Loom. The main suppliers of these looms in India are:

- Lohia Starlinger Limited
- J. P. Industries
- Kabra Extrusiontechnik Ltd. (KET) – Kolsite
- Windsor Machines Limited

## Leno bags

Leno bags are excellent for packing & preserving vegetables like potato, onion, ginger, garlic, cabbage etc. and fruits like pineapple, citrus fruits, raw mango, coconut etc.

### *Product Characteristics*

The Leno bags have widths between 20cm to 72cm. The length also varies as per the customer's requirements. The mesh again is as per requirement with a maximum of 574 tapes in the warp in different colours. Leno bags on an average weigh 50g (or less).

Exhibit C-84: key applications

Size (In cm)	Application
Width x height	
56.0 x 105.0	50 Kg Potato/ Onion
45.8 x 84.0	25 Kg Potato/ Onion
30.5 x 66.0	10 Kg Potato / Onion

The Leno Bag is made of netted fabric of virgin Polypropylene (PP) with colour Masterbatch.

### Market size and trade trends

#### *Market size estimate*

The market size of leno bags is estimated to be at Rs 800 Crore and 50 KT. Domestic consumption of leno bags is estimated to be ~Rs. 794 and exports at ~ Rs. 6 Crore.

Exhibit C-85: Market size of leno bags

	2012-13
Value of domestic consumption of leno bags (in Rs Crore)	794
Value of exports (in Rs. Crore)	6
Market size of leno bags (in Rs Crore)	800

\*source: IMAcS analysis, industry sources

#### *Key growth drivers and Inhibitors*

The key growth driver for usage of leno bags is the fruits and vegetables industry. There is great potential for the leno bags in India, India having significant production in Fruits and vegetable. Despite

the fact that India is the 2<sup>nd</sup> biggest producer of fruit and vegetables in the world, this market has still not been captured by Leno bags. Slow growth of agricultural produce is one of the reasons for slacking acceptance of leno bags in the country overall. Leno bags are also suitable for cold storage which is still to make headway in India.

### ***Import export scenario***

The export scenario of leno bags has been captured in Exhibit C-86 given below. The imports against leno bags for India are negligible.

Exhibit C-86: Export trends of Leno bags

HS code family	Applicable HS codes	2012-13
<b>Exports</b>		
<b>3923, 5407, 5516</b>	39231010, 39231090, 39232990, 39239090, 54075290, 54075300, 55162300, 58013690	Rs. 6 Crore

*\*source: IMAcS analysis, industry sources*

### **Machinery details**

The main machine required for leno bags manufacturing is the Loom. The main suppliers of these looms in India are:

- Lohia Starlinger Limited
- J. P. Industries
- Kabra Extrusiontechnik Ltd. (KET) – Kolsite
- Windsor Machines Limited

### **Quality Standards**

DOC.TXD 23(906) Textiles- Polypropylene (PP)/ High Density Polyethylene (HDPE) Woven Leno Sacks for Packing of Fruits and Vegetables

## Wrapping fabric

Wrapping fabric is made out of HDPE/PP, cotton canvas, etc. Unlaminated PP/HDPE Woven Fabric is mainly used for wrapping of paper rolls, paper bundles, steel coils, tyres, yarn cones etc.

### *Product Characteristics*

Wrapping fabric weighs 50 to 200 gsm and its size varies from 20 to 210 cms. The fabric is generally packed in roll form and can be run on automatic cutting and stitching machines.

Clear Woven Sheets (Natural Woven Laminated Sheets) are used for packing of used clothes etc. These sheets are see through and are mainly used as a wrapping material. The most common size is 40" \* 54" with side lamination and weighs up to 100 grams.

Lumber Cloth is a wide width fabric used to cover huge logs of wood. It can either be one side or both side laminated. It can be printed or non-printed as is available in roll form.

### Market size and trade trends

#### *Market size estimate*

The market size for wrapping fabric is largely constituted by the domestic consumption of the country. Domestic consumption is estimated to be at Rs 2150.35 Crore and 165.41 KT up from Rs 1350 Crore in 2007 -08 growing at a rate of 9.76%.

Exhibit C-87: Market size of wrapping fabric

	2012-13
Domestic consumption of wrapping fabric (in KT)	165.41
Value of domestic consumption of wrapping fabric (in Rs. Crore)	2150.35

\*source: IMAcS analysis, industry sources

#### *Key growth drivers and Inhibitors*

These fabrics are widely used in industries such as paper bundles, wrapping of paper rolls, steel coils, yarn cones, tyres etc. These fabrics can be utilized with automatic cutting & stitching machines for manufacturing bags too.

### Quality Standards

IS 6899:1997 Textiles - High density polyethylene (HDPE) woven fabrics

## Soft Luggage

The luggage industry is classified into hard and soft luggage. Hard luggage is mainly the large travel bags made from moulded plastic. Soft luggage is made out of woven fabrics like nylon and polyester. It comprises of uprights, totes, duffle and sky bags which can be with or without wheels and handles. The soft luggage today is becoming very popular due to the ease of carry as it is light and flexible. It includes handbags, military backpacks, athletic backpacks, wallets, briefcases and other soft sided luggage items.

### *Product Characteristics*

Outer dimensions of a soft luggage bag vary from 460mmX340mmX160mm to 790mmX620mmX280mm. The size of a small soft suitcase can vary from 20" to 31".

### Market size and trade trends

#### *Market size estimate*

The domestic consumption for soft luggage is estimated to be Rs.2,640 Crore and the technical textile component value is pegged at Rs. 480 Crore and 22.53 million sqm. This is a CAGR of about 25% over a base of Rs. 160 Crore market in 2007-08. Exports stand at Rs. 13.88 Crore, bringing the market size to Rs. 493.88 Crore.

Exhibit C-88: Market size of technical textile component in soft luggage

Market size for soft luggage	2012-13
Domestic consumption of soft luggage in Value (in Rs Crore)	2,640
Quantity of Technical Textile (In Million Sqm)	22.53
Value of Technical Textile (in Rs Crore)	480.00
Exports of Technical textile component (in Rs. Crore)	13.88
Market size of Technical textile component (in Rs. Crore)	493.88

*\*source: IMAcS analysis, industry sources*

#### *Key growth drivers and Inhibitors*

Out of the total luggage industry, 30% is estimated to be hard luggage while 70% is soft goods by value. The changing demographics and growing propensity of people towards soft luggage is reflecting in the growth of the segment which boasts of a 15% growth as revealed by our industry survey. Polypropylene makes up around 75% of the raw material pie for hard luggage. Hence, more and more people are shifting from hard luggage to soft goods. In the soft goods market, around 50% of the market belongs to

the unorganised sector. The price of a soft luggage in the organized market ranges from Rs 1,200 to Rs. 12,000 depending upon its size, raw material, etc.

Today, most luggage and travel bags companies in India are following international trends and designs closely because they are aware that the buyer is becoming more conscious of design and exclusive patterns looking luggage/baggage. With more and more people travelling, manufacturers, exporters and suppliers of handbags, bags, luggage and travel accessories ensure that each and every luggage item are given away with ample safety features, theft-proof, sturdy and strong.

**Exhibit C-89: Particulars about the soft luggage industry**

Particulars	
% of soft luggage industry in total luggage	70%
Value of textile in the total value of soft goods	15%
Average price of fabric used in soft luggage	Rs 213 per sq m
Share of organised sector in soft luggage industry	50%
Expected growth rate of the organised segment	15%
Expected growth rate of the unorganised segment	15%

**Key Manufacturers**

Key manufacturers in the soft luggage are mentioned in the Exhibit C-90 below with their corresponding soft luggage sales.

**Exhibit C-90: Key manufacturers of soft luggage in India**

Manufacturer	Year	Value* (Rs crore)
VIP industries	2012-13	586.46
Samsonite India	2012-13	NA
Safari Industries	2012-13	93.40

Source: Capitaline, Company Annual Reports, Company websites, Industry Survey

\*These are Net Sales figures for soft luggage for VIP and complete portfolio for Safari.

Soft goods market has an unorganised segment that accounts for about 50% of the total value. In the organised segment, the leading players are VIP, Samsonite and Safari. VIP's portfolio of brands includes V.I.P., Aristocrat, Alfa, Skybags and Delsey. In the organised sector, VIP is the market leader with almost

55% of the market share whereas Samsonite leads in the premium segment. Samsonite's global revenues in the year 2006-2007 were US\$ 1,070 million, out of which 7% were from India.

**Import export scenario**

The imports and exports were soft luggage are captured in Exhibit C-91.

Exhibit C-91: Import export trends for soft luggage

HS code family	Applicable HS codes	2012-13
<b>Imports</b>		
<b>4202</b>	42021110/20/30/40/50/60/90, 42022210/20/30/90, 42022910/90, 42021910/20/30/40/60/90, 42021190, 42022110/20/90, 42021210/20/30/40/50/60/80/90, 42023110/20/90, 42023290, 42029900, 42029200	Rs. 560.67 crore (TT component of around Rs 115.29 <sup>6</sup> crore)
<b>Exports</b>		
<b>4202</b>	42021110/20/30/40/50/60/90, 42022210/20/30/90, 42022910/90, 42021910/20/30/40/60/90, 42021190, 42022110/20/90, 42021210/20/30/40/50/60/80/90, 42023110/20/90, 42023290, 42029900, 42029200	Rs 66.11 crore(TT component of around Rs 13.88 <sup>6</sup> Crore)

\*source: IMAcS analysis, industry sources

<sup>6</sup> Estimated technical textile component value

## **Jute Hessian and Sacks (including Food grade jute bags)**

### **Jute Hessian**

Jute Hessian also termed as Burlap is a finer quality jute fabric that has been long used as the most preferred packaging material for all kinds of goods. Hessian is used for bags and many other coarse fabric uses, such as wrappers, wall coverings, etc. Presently, shopping bags are being made out of hessian fabrics. It is also used in the upholstery and home furniture. Also available in "dyed" or "bleached" form and treated with vegetable oil, Burlap meets the latest international standards for food safety.

### **Jute Sacks**

A range of heavy jute fabrics either in plain or twill weaves manufactured by using coarse jute fibre in larger percentage than used for manufacturing tarpaulin, hessian or such light fabrics.

Sacking refers to the coarser and heavier cloth, used primarily for sacks for packing materials, which do not need special protection, but has higher weight.

Jute bagging material is in demand because of the openness of the weave, which allows air to circulate while protecting the contents.

Sacking bags, specifically used for the purpose of storing agro-based products, are known as Hydro carbon free bags that have been treated with vegetable oils to destroy the harmful effect of hydrocarbons. Thus sacking bags have great demand not just in the cement industry but also in the agro-based industries.

Different categories of sacking are:-

- A-Twill
- B-Twill
- L-Twill
- D.W. Flour
- D.W. Salt
- D. W. Nitrates
- Heavy Cees
- Light Cees
- Sydney Woolpacks

- Australian Woolpacks
- Australian Cornsacks
- New Zealand Cornsacks
- New Zealand Woolpacks
- Fine Twill Cloth
- Cement Bags

### **Food Grade Jute Bags**

Food grade jute bags are jute sacks which comply with the IJO Standard 98/01. The Government of India has maintained the compulsory packing of food grains and sugar at 100% under Jute Packaging Materials (Compulsory use for Packing Commodities) Act, 1987 (JPMA).

### ***Product Characteristics***

#### **Jute Hessian**

A plain weave cloth made wholly of Jute with single warp and weft interwoven, weighing not more than 576 g/m<sup>2</sup>. Hessian fabrics are lighter than sacking fabrics.

#### **Jute Sacks**

Either plain or twill weave cloth made wholly of jute, inter-woven and weighing not less than 407 g/m<sup>2</sup>.

#### **Exhibit C-92: Description of twills**

<b>Twill</b>	<b>The weave that produces diagonal patterns on the surface of the cloth. In the Jute industry, generally 2 x 1 simple twill weave is used.</b>
<b>A-Twill Cloth</b>	A double warp, 2/1-twill weave sacking jute cloth weighing 750 g/m <sup>2</sup>
<b>B- Twill Cloth</b>	A double warp 2/1-twill weave sacking jute cloth weighing 643 g/m <sup>2</sup>
<b>L- Twill Cloth</b>	A double warp twill weave sacking cloth weighing approx. 716 g/m <sup>2</sup>
<b>Oslo Twill Cloth</b>	A twill sacking cloth for making bags of about 108 cm width weighing about 534 g/m <sup>2</sup>
<b>Brattice Cloth</b>	Hessian fabrics, which after rot and fireproofing is used in mines as windscreens and for ventilation purposes.
<b>Heavy Cee</b>	A double warp plain weave sacking jute cloth having 68 ends/dm and 35 picks/dm and weighing 673 g/m <sup>2</sup>

The difference between hessian and sacking is in the quality of the cloth and the jute used for its production, the difference being primarily one of fineness, the former being made of finer grade jute,

the latter of coarser qualities. Hessian can be available in cloth lengths while the mills usually convert sacking cloth into bags and sacks.

## **Market size and trade trends**

### ***Market size estimate***

The market size for jute hessian and jute sacks is tabulated in Exhibit C-95 below.

**Exhibit C-93: Market size of jute hessian and jute sacks**

	<b>2012-13</b>
Domestic consumption of jute hessian (in million MT)	0.166
Value of domestic consumption of jute hessian (in Rs. Crore)	1,238
Domestic consumption of jute sacks(in million MT)	1.12
Value of domestic consumption of jute sacks (in Rs. Crore)	8,354
Exports of jute hessian and sacks (in million MT)	0.155
Value of exports of jute hessian and sacks(in Rs. Crore)	1157.47
<b>Market size of jute hessian and sacks(in million MT)</b>	1.44
<b>Market size of jute hessian and sacks (in Rs. Crore)</b>	10,749.50

*\*source: IMAcS analysis, JCI*

The market size for jute hessian and sacks stands at 1.44 MT and Rs. 10,749.50 Crore.

### ***Key growth drivers and Inhibitors***

There is not much growth expected in the next five years as sacking segment faces threat from the polymer sacks, though hessian is expected to grow moderately by around 2%.

### ***Key Manufacturers***

Key manufacturers of jute bags and sacks include:

- Cheviot Co Ltd
- Gloster Jute Mills Ltd
- Birla Corp Ltd
- Bally Jute Co

### ***Import export scenario***

The import export scenario for jute hessian and sacks is tabulated in below.

Exhibit C-94: Import export trends for jute hessian and sacks

HS code family	2012-13
<b>Imports</b>	
Jute hessian and sacks	Rs. 2.93 crore
<b>Exports</b>	
Jute hessian and sacks	Rs 1157.47 crore

\*source: IMAcS analysis, JCI

### Machinery details

One of the key suppliers of machinery in India is Lagaan Engineering Company Ltd. situated in Kolkata.

### Quality Standards

The various standards applicable to Jute goods in India are listed below:

- IS 1943:1995 A-twill jute bags
- IS 2566:1993 B-twill jute bags for packing
- IS 2580:1995 Jute sacking bags for packing cement
- IS 2818(Part 1):1990 Indian hessian
- IS 2818(Part 2):1971 Indian hessian
- IS 2818(Part 3):1971 Indian hessian
- IS 2818(Part 4):1971 Indian hessian
- IS 2818(Part 5):1974 Indian hessian
- IS 2818(Part 6):1977 Indian hessian
- IS 2873:1991 Packaging of jute products in bales
- IS 2874:1993 Heavy cee jute bags
- IS 2875:1993 Jute corn bags
- IS 3667:1993 B-twill jute cloth
- IS 3750:1993 Jute corn sack cloth
- IS 3751:1993 Heavy cee jute cloth
- IS 3790:1991 Hessian bags
- IS 3966:1967 DW-Flour jute cloth
- IS 3984:2002 DW-Flour bags
- IS 4436:1989 Jute bagging for wrapping cotton bales

- IS 7406(Part 1):1984 Jute bags for packing fertilizers
- IS 8569:1977 Jute fabrics used in the packing of textile products
- IS 9113:1993 Jute sacking - General requirements
- IS 9685:2002 Sand bag
- IS 7406(Part 2):1986 Jute bags for packing fertilizers
- IS 10036(Part 1):1982 Jute canvas
- IS 10036(Part 2):1982 Jute canvas
- IS 11193:1984 Jute canvas postal bags
- IS 12001:1987 Jute Sacking cloth for cement bag
- IS 12154:1987 Light weight jute bags for packing cement
- IS 12174:1987 Jute synthetic union bags for packing cement
- IS 12493:1988 Specification for jute bags for packing sugar
- IS 12494:1988 Specification for jute bags for packing urea
- IS 12626:1989 Specification for laminated jute bags for packing milk
- IS 12650:2003 Jute bags for packing 50 kg. foodgrains
- IS 13649:1993 Polyethylene lined jute bags for packing tea
- IS 14342:1996 Jute yarn/twine - Packaging code
- IS 15138:2002 Jute bags for packing 50 kg sugar

Standards set for food grade jute bags in India and internationally are:

- IJO Standard 98/01
- Sacks for the Transport of food aid, European Standard EN 766
- Erstwhile British Standard 3845:1990

Besides the above mentioned established standards the draft standards are listed below:

- DOC.TXD 3(687) Jute sacking - General requirements
- 2 DOC.TXD 3(688) Jute bags for packing 50 kg sugar
- DOC.TXD 3(9001) Food grade jute packaging materials

## Tea Bags

Tea bags are sold by organised tea producers to the high-end consumers. Tea bags consist of a filter paper pouch with a thread, which holds the tea powder and a tag. The tea bag is dipped in hot water / milk to produce the beverage. The two major marketers of tea bags in India are Hindustan Unilever Limited (HUL) and Tata Tea Limited.

### *Product Characteristics*

Tea bag filter paper is made with a blend of wood and vegetable fibres. The vegetable fibre is bleached pulp abaca hemp, a small plantation tree grown for the fibre, mostly in the Philippines and Colombia. Heat-sealed tea bag paper usually has a heat-sealable thermoplastic such as PVC or polypropylene, as a component fibre (100% non-woven technical textile) on inner side of the teabag surface. The filter paper used for making tea-bags is a 12-17 GSM non-woven material. The heat-sealing type tea-bag paper is of 16.5 to 17 GSM approx while the non-heat sealed tea-bag paper is around 12 – 13 GSM.

### Market size and trade trends

#### *Market size estimate*

The market size for tea markets is chiefly driven by the domestic consumption estimated to be Rs 543 crore. This is a significant rise at a CAGR of 22% from Rs. 200 crore market, estimated in 2007 – 08.

The total size of the organised tea market in India is around 400 million kilograms. The penetration of tea bags in the country is around 1.5-2% of the organised tea market and still remains to be exploited. Most of the tea-bags contain about 2 grams of tea though some of the bags contain up to 4 grams of tea. Hence, the total number of tea-bags used in India is estimated is around 6 – 6.7 billion.

The exports for tea bag filter paper is negligible. Thus the domestic consumption itself is the key contributor to the market size of tea bags. The market size of tea-bag filter has been estimated as given below in Exhibit C-95.

Exhibit C-95: Market size of tea bag filter

<i>Tea-bags filter</i>	<b>2012-13</b>
Value of Domestic consumption of Tea bag filter paper (in Rs. crore)	Rs 542.85 crore

*\*source: IMAcS analysis, industry sources*

### ***Key growth drivers and Inhibitors***

Key growth driver of the tea bag filter paper is the consumption of tea bags by masses at large which is still a long way off. The tea bag manufacturers also have a proclivity to import the filter paper rather than source it from within India. Also, industry player expect only 5 – 7% growth in this segment.

### ***Key Manufacturers***

Key manufacturers of tea bags include:

- J.V.Gokal
- Madhu Jayanti

### ***Import export scenario***

The import scenario for tea bag filter paper is captured in the below. The estimated export figures for Tea-bags filter paper from India are negligible, totalling to 0.57 MT in quantity terms and Rs. 0.03 Crore in value.

Exhibit C-96: Import export trends of tea bag filter

HS code family	Applicable HS codes	2012-13
<b>Imports</b>		
<b>4805, 4823</b>	48054000, 48232000	Rs. 39.42 crore

*\*source: IMAcS analysis, industry sources*

### **Machinery details**

Key machinery employed are Consenta(from Tecchnomechanica) and T2 Prima(from Mais, Argentina).

## 5. Sportech

Technical textiles used for sports purposes are termed as Sport technical textiles or Sportech. Sportech includes all types of fabrics that are used for development of sport related clothing or sporting goods like high performance swim wears, parachute fabrics or fabrics used for making of inflatable balls. Along with this fabric and textiles used in accessories for sports like shoe lining fabrics and sleeping bags are also included in Sportech.

### List of Products

The key technical textile products under the segment are as under:

- Sport composites
- Artificial turf
- Parachute fabrics
- Ballooning fabric
- Sail cloth
- Sleeping bags
- Sport nets
- Sport shoe components
- Laminated tents
- High performance swimwear and sportswear

### Market size and trends

The total estimated market size of Sportech is estimated to be Rs. 4,536. Close to 98% of the entire market by domestic supply. The market is mostly dependent on the domestic consumption with exports potential limited to just 8% of the total market. Product wise market size estimate has been shown in the exhibit below.

Exhibit C-97: Market size estimation

Product	2012-13 ( All figures in Rs. Crore)				Market size
	Production	Import	Export	Domestic Consumption	
<b>Sport composites</b>	728	27	288	467	755
<b>Artificial turf</b>	-	40	-	40	40
<b>Parachute fabrics</b>	98	2	3	97	100
<b>Ballooning fabric</b>	1.3	0.2	-	1.5	1.5

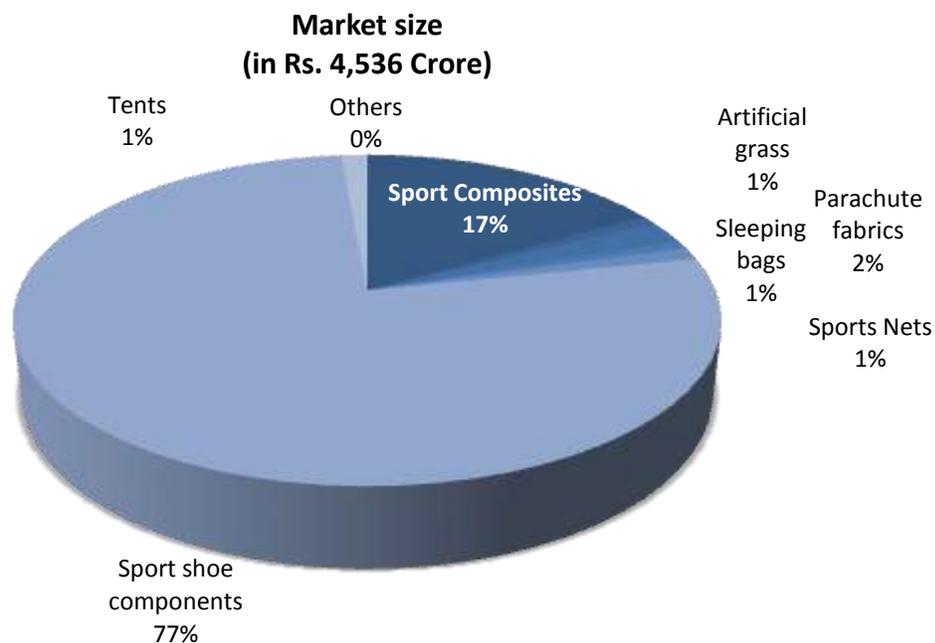
Product	2012-13 ( All figures in Rs. Crore)				Market size
	Production	Import	Export	Domestic Consumption	
Sail cloth	0.0	0.1	-	0.1	0.1
Sleeping bags	34	2	11	25	36
Sport nets	55	-	47	8	55
Sport shoe components	3428	58	3	3483	3486
Laminated tents	62	0	0	62	62
High performance swimwear and sport wears	-	1.5	-	1.5	1.5
<b>Total</b>	<b>4406</b>	<b>130</b>	<b>352</b>	<b>4184</b>	<b>4536</b>

Source: IMAcS analysis

\*Market size is calculated as export + domestic market

Sport shoe components having 77% share in the segment. Other key product is sport composites that has 17% share. Rest of the products have very limited market in India. The product wise market share is as shown in the exhibit below.

Exhibit C-98: Market size pie product wise



Source: IMAcS analysis

### Key players

Key players manufacturing sports technical textiles in India are as under:

- Great Sports Infra Pvt. Ltd.
- Indrajeet Mehta Construction Co. Ltd.
- Entremonde Polycoaters
- Kusumgar Corporates
- S G Pvt. Ltd
- S S Pvt. Ltd
- Bhalla Sports Pvt. Ltd
- Cosco India Ltd
- Freewill Sports Pvt. Ltd.
- Page Industries Ltd.
- Adidas India marketing Ltd.
- Garware Wall Ropes Ltd.
- Standard Newar Ltd.
- K C industries
- Bata Limited
- Liberty
- Jasch Industries Ltd.
- Bandhu Aero Space Ltd.

The detailed analysis of each product of the segment is done in the subsequent sections.

## Sport Composites

Sports composites usage in India includes boxing equipments, inflatable balls and protective equipments for cricket

### ***Product Characteristics***

*Boxing equipments* consist of Boxing Gloves, Boxing Punching Gloves, Boxing Head Guards, Boxing Punching Pads, Abdominal Guard, Speed Ball, Punching Bag etc.

*Inflatable balls* consist of football, volleyball, basketball, handball etc. Footballs account for 50% of the market of inflatable balls. Footballs have varying sizes i.e. Size-3, Size-4 and Size-5. Circumference for size 5 is 68.5cm to 69.5cm. Official weight of the football is 420~445 grams with ball pressure of 0.8 bar.

*Protective equipments* for cricket comprise of leg-guards, batting gloves, wicket keeping gloves, thigh pads, helmets, caps & hats, cricket kit bags etc

### **Market size and trade trends**

Indian sporting goods industry is concentrated primarily in the cottage and small-scale sector. It is a highly labour intensive industry and also employs a large number of women as well. Most of the units work on a job work basis for the major manufacturers/exporters and also sell their produce to wholesalers who in turn sell these equipments to sports goods retailers. The market for these goods is mainly driven by the export demand and the institutional demand, with very limited retail sales.

Sports composites market in India is constituted by the inflatable balls, cricket protective items – guards, gloves and helmet and the boxing equipments like gloves, etc. The market size for these products has been done using insights from key manufacturers and inputs from Sports Goods Export Promotion Council (SGEPC).

### **Market size estimate**

The estimated market size for different sport composites are shown in the exhibit below

Exhibit C-99: Market size estimate

	2012-13		
	Cricket protective gears	Inflatable balls	Boxing and other gears
<b>Value (in Rs. Crore)</b>	Rs. 229 Crore	Rs.433 Crore	Rs. 93 Crore

*\*source: IMAcS analysis, industry sources*

The market for cricket equipments has grown at 14% in the last five years owing to the increasing interest of people in sport and growing number of cricket clubs and camps. The market for inflatable balls has also shown similar trend growing at 11%. However, while Cricket equipment market has grown mostly on account of domestic market which grew at 20%, market for inflatable balls has grown on account of rising exports which grew by 14%. The market for boxing gloves and equipments is also growing on account of growing export market which has grown by 37%. The total sport composite market has grown at 13% during the last five years.

### **Key growth drivers and Inhibitors**

The sports composites industry is driven by both the export market and the domestic market. The producers in India have their competence due to the cost of manufacturing being low. The domestic market of these products is growing due to increased interest of students in sports. With many new cricket coaching clubs and cricketing summer and winter camps being organised, the market for cricket is set to grow at a good rate in the coming years. The market for inflatable balls on the other hand is seeing slow but steady growth due to increased focus of corporate and government institutions on promotion of the sport through education institutes and corporate having their own football clubs. With the proposal of having an Indian premier league for soccer, the market is expected to grow. The market is expected to grow at 12% per annum driven by both domestic and export markets.

### **Key Manufacturers**

Manufacturing of sport composites in India is done mostly by small scale industries. These industries are labour intensive and are generally clustered together. The key clusters for manufacturing of sports composites are located at Jalandhar and Meerut, with Jalandhar doing a lot of Inflatable balls and Meerut excelling in the Cricket and boxing sports goods industry. Some of the prominent manufacturers for the segment are:

- Sanspariel Greenland Pvt. Ltd.

- Bhalla Sports Pvt. Ltd.
- Soccer India Pvt. Ltd
- Freewill Sports Pvt. Ltd
- Cosco India Ltd.
- K L Mahajan and Company
- Shiv Naresh India Ltd.

### ***Import export scenario***

While the export market for cricket goods exports has remained stagnant growing at just 1%, the export market of inflatable balls and boxing equipments has grown by 14% and 37% respectively. The details of imports and exports of sports composites are shown in the exhibit below:

**Exhibit C-100: Import export trends**

HS code family	HS code description	Applicable codes	HS	Product	2012-13
<b>Exports</b>					
<b>9506</b>	Inflatables – football, volleyball, basket ball, others	95066210 95066220 95066230 95066290		Inflatable balls	Rs. 183 Crore
	Equipment of Gym, cricket, boxing, others	95069110 95069920 9506999		Cricket protective gear	Rs. 53 Crore
				Boxing equipment	Rs. 53 Crore

*\*source: DGCIS, IMAcS analysis,*

### **Machinery details**

Manufacturing of these products is a labour intensive work requiring a lot of sewing. Therefore, the machinery requirement is mainly of stitching machines.

### **Quality Standards**

The standards for different Sports composites are specified by their governing bodies. Currently, the BIS have standards for only the batting and boxing gloves. These are:

- IS 3870:1983 – Batting glove specification
- IS 3874:1987 - Boxing glove specifications

## Artificial Turf

Artificial turf, or synthetic turf, is a man-made surface manufactured from synthetic materials with appearance similar to natural grass. It is used for making world-class surfaces for playing sports (especially hockey and soccer) which are normally played on grass. The hockey stadiums account for most of the consumption of the artificial turf in India. It is also used indoors or outdoors for landscaping. Artificial turf is considered a safe alternative to natural grass; turf has no direct harmful effects to pets or children. Several studies have shown that the artificial turfs have a higher injury rate than grass on playgrounds. The new manufacturing and installation procedures have resulted in lowering of injury rates than on natural grass.

### *Product Characteristics*

The artificial turf system consists of various layers - the pile fibres & backing cloth, shock absorbing layer and the supporting base.

- **Pile Fibre** - The grass like piles are non abrasive and soft to touch. The synthetic grass is made of either the polyamide nylon/nylon 6.6 or PP/PE, which is custom extruded into a monofilament ribbon form. The pile fibre has to allow for smooth ball roll and bounce, support non-directional foot traction, allow for water permeability and should have the correct balance of strength, elasticity and stiffness to withstand the wear and tear of regular usage.
- **Backing Fabric** - the material to which surface fibres are attached to form the underside of the artificial turf surface. The backing has to permit water to flow through the fabric readily.
- **Shock-Absorbing Foam** - provides cushioning for running or falling athletes. The foam is made of a closed-cell polymer alloy like polyurethane, typically 1/2 inch in height and perforated for vertical drainage
- **Supporting Base** - supports the load placed on the entire structure, typically a 2-feet or 3-feet layer of asphalt or concrete

The artificial grass fibres that are used are of two different grades –

1. High grade Poly-ethylene grass – It is a high density (high GSM) non-directional grass.
2. Polypropylene grass fibres - These fibres are interlinked to form the artificial grass. However, its density (GSM) is lower than PE grass and it is directional grass.

The cost and quality of artificial grass depends on three different parameters:

1. **Pile Fibre length:** The cost of the artificial turf is directly proportional to the length of pile fibre. It generally comes in two different lengths – 9 mm and 13 mm. The length of the pile fibre determines the amount of fibre that goes into surface. Hence, it is a major price determining factor.
2. **Density (GSM):** The density of the weaves determines the quantity of the fibre required. Hence a high density artificial grass would be costlier than a low density one.

### **Key Application**

Artificial grass is being used for providing artificial surfaces for sports as well as for landscaping and decorating purposes. The use of artificial grass for different sports and their specific requirement is as shown in the table enumerated below:

**Exhibit C-101: Usage norms for artificial turf**

S.No	Application	Average Requirement (in sq. ft)	Average cost (in Rs./ sq m)
1.	Hockey Turf	67000	3,770
2.	Football turf	67000	3,770
3.	Cricket wickets	1000	3,350
4.	Golf putting greens	400	4,000

*\*Dollar to rupee conversion rate – Rs. 55/ USD*

*\*source: industry survey*

The use of artificial grass offers the following benefits:

1. **Low maintenance:** As compared to natural grass, the maintenance required for artificial grass is very low.
2. **All weather fields:** Artificial grass fields can be used in all weathers even during the rains. This is a major benefit of the playground as it can be dried very quickly as compared to the natural grass fields which require aggressive efforts for drying.
3. **Conservation of water:** Rainwater on the artificial turf can be easily harvested using the underlining pipes.
4. **Conservation of Soil:** While natural grass maintenance requires use of a lot of fertilizers, pesticides and insecticides which increases the toxicity and the ground water, use of artificial grass does not require any such measures.

### **Market size and trade trends**

Artificial turf market in India is mainly driven by usage in infrastructure up-gradation of hockey fields and to some extent soccer fields. Based on industry inputs it is estimated that close to 35 hockey fields would be upgraded in the XII<sup>th</sup> five year plan indicating that an average of 7 fields are upgraded every year. An average of about 3 football fields is up-graded every year in India. Hockey and soccer together account for the major chunk of usage of artificial turf. In addition to this, usage as cricket wickets, golf greens and landscaping greens is rapidly catching up in India.

### ***Market size estimate***

The market size of artificial turf is estimated to be of 168 MT which is valued at ~Rs. 40 Crore. The entire market is based on imports with no manufacturers in India. The industry has very limited players who are primarily importers of artificial turf. The majority of imports in India are of Tiger turf and Field turf, two of the recognised brands supplying into Indian market. In addition to that, lot of cheap Chinese imports also comes in which are used mostly for landscaping. The market size estimate of artificial turf for 2012-13 is as shown in the table below:

**Exhibit C-102: Market size estimate**

	<b>2012-13</b>
<b>Quantity (in MT)</b>	168.6
<b>Value (in Rs. Crore)</b>	40

*\*source: IMAcS analysis, industry sources*

### ***Key growth drivers and Inhibitors***

Usage for large sports installations like and hockey and soccer turf are the key drivers for the industry. With increased focus of National and regional government of development of Sports after the recent performances by Indian sportsmen in world events, the demand for hockey and soccer turfs are expected to gradually rise in coming years.

Along with these, smaller applications in cricket wickets are rapidly growing with many cricket associations going for low maintenance cricket wickets. In addition to that demand from corporate for landscaping and golf greens is growing at a rapid rate, with many new infrastructure parks and premium residential societies coming up.

While rapid growth is expected in Indian artificial turf market, the market faces stiff challenge from low cost Chinese imports, which are quickly capturing the growing retail demand in India owing to its cheaper rates. This along with the small retail market for artificial turf has been a major deterrent for organisations like field turf and tiger turf that have not started manufacturing of artificial turf in India, despite easy availability of base fabrics and latex in India. The market is expected to grow at 12% per annum during the coming years.

### ***Import export scenario***

The entire market of artificial turf in India is catered via imports. There are no manufacturers of artificial turf in India. The key HS codes under which imports were made in 2012-13 have been listed in the table below. There are set HS codes defined for import of artificial turf. However, the commonly used HS codes has been shown in the table.

**Exhibit C-103: Import export trends**

HS code family	Applicable HS codes	HS code description
<b>Imports</b>		
	39189010	Floor covering of lynoxin
	54049090	Other Synthetic Textiles of width less than 5 mm
	57033090 57039090	Textile floor covering of manmade textile material Other floor covering of other textile material
	67021090	Other synthetic articles

*\*source: DGCIS, IMAcS analysis*

The market is governed by only a few key importers. These players have been listed as under:

1. Great Sports Infra Pvt. Ltd.
2. Sports Infratech Pvt. Ltd
3. Indrajeet Mehta Construction Company Ltd.
4. Altius Sports and Leisure Pvt. Ltd.

### **Machinery details**

The pile fibre used for making of artificial turf is a specialise fibre whose patented production rights is with only a limited few organisations in the world. Although China also manufactures the pile fibre,

however, the quality in terms of GSM of the chine product is very low and is not preferred for sporting applications. It is used only for landscaping requirements.

### **Quality Standards**

The International Hockey Federation (FIH) has developed standards for Hockey turfs. Manufacturers of synthetic turfs have to adhere to the FIH standards to get their products registered as FIH approved products. These products are tested and verified by a FIH accredited laboratory.

The standards for artificial turf used in football grounds are governed by FIFA. It specifies various ball / surface and player / surface tests for these turfs and certifies as FIFA recommended 1 Star and 2 Star.

1 Star is mainly for recreational, community and municipal use while 2 Star for artificial turf designed specifically for the playing characteristics of professional football. Both the FIFA recommended 1 Star and 2 Star have to go through a series of stringent laboratory and field tests for getting the FIFA certificate.

## Parachute Fabric

A parachute is a device used to slow the descent of a free falling body or load. The product is a large fabric with ropes attached to it. When the body free falls, the fabric traps the air, thus, using the air resistance to slow down the descent.

### *Product Characteristics*

A parachute consists of four main components: parachute canopy, rip-cords, suspension lines and the harness.

- **Parachute canopy-** Parachute canopy the actual parachute fabric that is tied using the ropes. The canopy act as a barrier for the air flow thus slowing the fall.
- **Harness** - The pack is fastened to the person's back or front with a harness. The harness is specially constructed so that the parachutist is not injured as the forces of deceleration (slowing down), gravity and wind are transmitted to the wearer's body as the chute opens.
- **Rip-cord** - A rip-cord is used to open the duck pack and allow the chute to deploy (pop out). The rip-cord can be used in three different ways (pulling the rip manually, a static line connected to the aircraft deploys the chute as the person jumps or automatically as the pilot is ejected from the aircraft).
- **Suspension lines** - Suspension lines, or shrouds, connect the canopy (parachute cloth) to a ring on the harness. The line is continuous from the ring, through a seam in the shroud over the top of the chute and back down to the ring again.

Parachute canopies are primarily made of high tensile nylon or polyester multi-filament fibres, generally ripstop woven, from 32 to 200 deniers. Ripstop fabrics are woven fabrics whilst using a special reinforcing technique that makes them very resistant to tearing and ripping. Older lightweight ripstop fabrics display the thicker interlocking thread patterns in the material quite prominently, but modern weaving techniques make the ripstop threads less obvious.

Ripstop fabrics have high strength to weight ratio. The smaller tears and rips cannot easily spread further in the fabric. Air-permeability is one of the most important characteristics because it determines the behaviour of the parachute itself, the rate of descent depends dramatically on this characteristic. The fabric should be of minimal thickness to enable folding of the parachute into a bag.

Harness, webbing, tapes etc are made-up of high tensile nylon yarn (denier range 210 to 840 denier) as nylon has the highest strength to weight ratio.

### **Market size and trade trends**

Market for parachute fabrics is governed by demand from Indian Armed forces, which commands 95% of the market. The demand is higher for break parachutes used in fighter aircrafts and supply drop parachutes which together account for close to 70% of the demand from Armed forces.

### ***Market size estimate***

Taking into account the average price of different types of parachutes and the production figures of Ordnance factories the market size estimate for parachute fabrics in India is estimated taking into consideration insights from major manufacturers. The estimated market potential for parachute fabrics in India in 2012-13 is of 6.2 million metres which is valued at Rs. 100 Crore.

**Exhibit C-104: Market size estimate**

	<b>2012-13</b>
<b>Quantity (in Mn. metres)</b>	6.2
<b>Value (in Rs. Crore)</b>	100

*\*source: IMaCS analysis, industry sources*

The market for parachute fabrics in India has increased considerably over time driven mainly by increasing production of the ordinance factories. Currently Ordnance factories produce about 1.17 lakh parachutes of different kinds – supply drop, break parachutes, man drop parachutes, torpedo parachutes and inflammation parachutes.

### ***Key growth drivers and Inhibitors***

The market for parachutes in India is driven by the demand from Indian armed forces. In the armed forces the demand for supply drop parachutes and break parachutes is highest and is expected to grow with increasing deployment of armed forces personnel in high altitude and hazardous environments. In addition to that demand for break parachutes would also increase as India upgrades its Air force with modern fighters.

However, the applications other than by Armed forces like adventure sports – sky diving and paragliding is yet to become popular in India. As a result the demand from private sector is very low.. The

market is expected to grow at 12% driven by both entries from private firms as well as increased production of ordinance factories.

### **Key Manufacturers**

Key manufacturers of parachute fabrics in India are:

- Kusumgar Corporates
- Entremonde Polycoaters

### **Import export scenario**

Import and export of parachute fabrics from India has had a small share in the total market. Most of the production is utilised domestically. However, lately ordinance factories along with other parachute fabric manufacturers have shown interest in exports and the exports value for 2012-13 stands at Rs. 3 Crore. Imports are estimated at Rs. 1.5 Crore.

Exhibit C-105: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5407</b>	Bleached Unbleached and other parachute fabrics	54071011 54071021 54071091	Rs. 1.9 Crore
<b>Exports</b>			
<b>5407</b>	Bleached Unbleached and other parachute fabrics	54071011 54071021 54071091	Rs. 3 Crore

\*source: DGCI, IMAcS analysis

### **Quality Standards**

Quality control is a stringent requirement for parachutes. The relevant standards are framed by Aerial Delivery Research and Development Establishment, Agra, India. In addition to that BIS also has standards for parachute fabric and parachute components under standard :

- IS 2964:1987 – Breaking cord for parachute
- IS 2970:1987 – Cotton fabric for supply drop
- IS 3449:1984 – Cotton webbing for parachute
- IS 14564: 1998 – Cotton tapes for personal parachute

## Hot Air Balloon fabric

Ballooning fabric is the envelope fabric used in hot air balloons, inflatable balloons and bouncies. These are high tenacity strong fabrics made out of polyester, taffeta or nylon often coated with silicon. The ballooning fabric industry is a very niche and small market with very limited players across the globe catering specifically to the hot air balloon demand in India. In addition, the market for inflatable balloons which are often used for publicity is growing are where ballooning fabrics are used these days.

### *Product Characteristics*

The ballooning fabrics are usually classified on the basis of the usage. The three major usage of ballooning fabrics are:

1. **In hot air Balloons** – Silicon coated Nylon or taffeta fabrics are used for the ballooning requirements in Hot air Balloons. These are high tenacity fabrics tested for fire retardant properties, strength and abrasion resistance. These require high tenacity silicon coated taffeta or nylon fibres. They constitute a small but very important part of the hot air balloon. It has a general life of about 5 years.
2. **In inflatables** – Inflatables are gas or air filled inflatable balloons that are used for publicity during events. These have come into demand recently with organisations investing on their publicity stunts. Here the entire product is a technical textile product.
3. **In Bouncies and zorb balls** – Bouncies are air filled fabrics made of nylon or polyester, which are used as a playing ground for kids. It can be often seen at different malls or fairs.

The consumption of ballooning fabric for the three segments is shown as under:

**Exhibit C-106: Consumption norms for Hot air balloon fabric**

S. No.	End product	Type of fabric	Average requirement of Ballooning fabric
1.	Hot air Balloons	Siliconised Taffeta or Nylon with FR coating	700 metres for a small balloon of 2 people to 1500 metres for larger ones capable of flying up to 8 persons
2.	Inflatable balloons	Nylon Taffeta with FR coating – 210 GSM	70 metres for a small Inflatable up to 12 metre height
3.	Bouncies	High tenacity polyester	Depends on specific requirements

### Market size and trade trends

There are only two manufacturers of hot air ballooning fabrics in India. The market is mainly driven by the requirement of inflatables which are used at events, corporate functions and fairs for publicity purposes. The market for hot air balloon in India is very small, with just three such balloons being made in last three years.

#### *Market size estimate*

The market for ballooning fabrics has been stimulated based on inputs of key ,manufacturer of ballooning fabrics in India. The estimated market size for the same is about Rs. 1.5 Crore mainly due to the inflatable market.

Exhibit C-107: Market size estimate

	2012-13
Quantity	15.3 Lakh metres
Value	Rs. 1.5 Crore

*\*source: IMAcS analysis, industry sources*

The market has grown at just 5% in the last five years, due to lower promotional events by corporate and lower demand for inflatable because of the ongoing recessions. As far as hot air balloons are considered, the market in India is still in a very nascent stage and has not grown in the last five years. The market for zorb balls and bouncies on the other hand has grown in volume but the value addition premium that was being commanded in the industry has drastically one down with prices of bouncies coming down to around Rs. 20,000 from close to Rs. 50,000 around five years back.

#### *Key growth drivers and Inhibitors*

The major growth drivers for the Ballooning fabric industry in India in the coming future:

- **Growth in Hot air balloon sports** – Increase in hot air balloon sports could be the major boost to the ballooning fabric manufacturers. However, currently India is not expected to see such growth in the sports sector.
- **Increase in publicity expenses of corporate houses** – The biggest driver of ballooning fabric industry is the publicity expenses of corporate in inflatable balloons. The growth of the industry is directly correlated to the growth in publicity expenses of large corporate houses.

#### **Impediments**

- **Heavy restrictions by DGCA** – As hot air ballooning is a risky sport, the DGCA closely monitors it. Heavy restrictions, like no permission to fly hot air balloons around New Delhi have been a major deterrence for the industry, preventing it from growing around Delhi.

While the market for hot air balloons is expected to grow at a very trivial rate, the market for inflatables would be driving the segment with a high growth rate. Over all the market is expected to grow at 8%.

### **Key Manufacturers**

There are only two manufacturers of ballooning fabric in India - Bandhu Aerospace Pvt. Ltd. and Unique Inflatables.

### **Import export scenario**

Import of ballooning fabric in India has gone up by 36% in the last five years. Manufacturers in India have been purchasing fabric from outside depending on the demand from customer. Export of hot air balloons has been negligible in 2012-13, indicating lower demands from European countries who are the major customer for ballooning fabrics from India.

Exhibit C-108: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
	Balloons and dirigibles; gliders, hang gliders and other non-powered aircraft.	88010020*	Rs. 0.24 Crore

\*source: IMAcS analysis, industry sources

\*Also shipped in 53101011

### **Quality Standards**

Director General of civil aviation (DGCA) is the regulatory body for hot air balloons in India. The standards prescribed in FAR Part 31(Federal Aviation regulations) for the design are the minimum requirements for airworthiness of the hot air balloons. Hot air balloon cannot be flown unless it possesses a valid Certificate of Airworthiness. The suitability and durability of all materials must be established based on experience or tests. It has to be ensured that the material has the strength and other properties assumed in the design.

Persons/firms desirous to take up design and manufacture of hot air balloons have to intimate the DGCA of their intention and apply for necessary approval as required under CAR Section 2 - Series 'E' Part I.

There are several security requirements mandated for flying air balloons. One time security clearance of the manufacturer, owner, and operator shall be obtained from the State Police authorities before initial commencement of the operations. The hot air balloon shall not be sold or disposed of in any way to any person or firm without production of a certificate from the DGCA. The hot air balloon shall not be flown over entire air space covering VIP locations, defence installations, other restricted and prohibited areas. The hot air balloon shall also not be flown over an assembly of persons or over congested areas unless prior permission in writing is obtained from appropriate authorities. The restricted areas are notified by the DGCA from time to time in consultation with the Ministry of Home Affairs.

## Sail cloth

Sail is a large piece of fabric (usually canvas fabric) by means of which wind is used to propel a sailing vessel. Sails were used for in every type of boats before the advent of motorized boats. In the modern times, the sails are used in sailing boats, yachts for sports and recreational purpose.

### *Product Characteristics*

Earlier, sails were made from flax (linen), hemp or cotton in various forms including canvas. However, modern sails are rarely made from natural fibres. Most sails are made from synthetic fibres ranging from low-cost nylon or polyester to expensive aramids or carbon fibres.

The cotton canvas sails tend to wear out faster and are not capable of achieving high sail speeds. They also tend to be more bulky compared to sails made of polyester and polyamides as they have a higher strength to weight ratio.

The usage of sail cloth is primarily in the following segments:

- **Luxury yachts** - The demand of luxury yachts in India less. They have a huge potential for leisure tourism as is the case in the developed countries. Royal Bombay Yatch Club is the leading yatch club having membership of 90% of luxury yatch owners in India.
- **Sporting sail boats** - Sailing as a sport is yet to become popular in India. The Yachting Association of India (YAI) is promoting the sport in the country, developing and training judges, umpires and other administrators of the sport and representing the sailors in all matters concerning the sport. There are 55 clubs affiliated to YAI, spread across various parts of the country like the Kerala Yachting association, Tamil Nadu Sailing Association, etc. The sporting sail boats use modern sail cloths which are made from synthetic fibres which are imported into India. The sporting sails boats are categorized into various classes. There are 9 class associations affiliated to YAI, ranging from the smallest, the Optimist Dingy, to the largest, the J 24 class. The fabric requirement is dependent on the type of class.

Exhibit C-109: Sail cloth requirement for different boats

Key classes of Yachts in India	Type	Requirement of Sail cloth per Yacht in square metre
Laser	Centre boat	7.06
Laser Radial	Centre boat	5.76
470	Centre boat	9.45

- **Non motorized Fishing boats** - These sail boats are used by small fishermen who cannot afford the motorized fishing boats. These boats are propelled by sails made of natural fibres. The canvas sails are being substituted by hand plastic sheeting or sacking.

### **Market size and trade trends**

The requirement for synthetic sail cloth is very small in India due to the small fleet size. The growth of luxury yacht segment and the sport yacht sailing are the key drivers for the sail cloth industry in India. However, after the 2009 terrorist attacks a series of restrictions has been put up on luxury yacht sailing. In addition to that the increase in import tariff of luxury boats from 20% to 48% by the central government has kept the demand down.. The number of sail yacht in Indian waters is very low, as a result the replacement market is very small.

In absence of any yacht manufacturer and small size of Indian fleet, there are no significant manufacturers of sail cloth in India. The total market is entirely dependent on import of sail cloth which was just about Rs. 12 lakh in 2012-13. The market is not expected to grow in a big way in coming years due to various sailing restrictions on yacht and luxury boats and lack of proper parking bay. It is expected to grow slowly at just around 4%.

### ***Import Export trends***

The total import of sail fabric in 2012-13 was 12 lakh rupees equal to 2,005 sq. m. While the overall imports have grown from less than Rs. 1 lakh in 2007-08, the market is still very small.

### ***Raw materials***

The performance of a sail depends on two crucial aspects: Sail Design and Sail cloth. The sail cloths are tightly woven fabrics and mostly made of Polyester and polyamides like Nylon. These fabrics have a GSM of 200-600. Some of the high value sail cloths are laminated using sheets of PET.

An ideal sail cloth should have the following properties:

- Tear resistance
- Modulus of elasticity: stretch resistance per weight
- High Tensile strength or tenacity
- High breaking strength per unit weight
- Good Creep properties (the long term stretch of a fibre or fabric)
- UV Resistance

***Quality Standards***

There are relevant Indian standards for sail cloth.

## Sleeping bags

A sleeping bag is a protective "bag" for a person to sleep in, similar to a blanket that can be closed with a zipper (allowing it to be folded in half and secured in that position) and functions as a bed while camping, hiking, hill-walking or climbing. Its primary purpose is to provide warmth and thermal insulation. Sleeping bags are used at high altitudes in extremely cold weather. It also protects against wind chill, precipitation, etc.

### ***Product Characteristics***

The basic design sleeping bags work well for most camping needs but are inadequate under more demanding circumstances. The second major type of sleeping bags is mummy bags (because of its shape). Most modern sleeping bags are of a 'mummy' shape as it is the most thermally efficient design. A sleeping bag with little or no 'dead space' around the user is warmer as there is less air to warm up with heat from the body.

### **Market size and trade trends**

Sleeping bags in India is mostly used by armed forces and in small numbers for camping and mountaineering. As a very small part of the population is involved in adventure sports like camping and mountaineering, the retail market for sleeping bags is very small. Out of the institutional sales, close to 90% of the demand for sleeping bags comes from armed forces. As a result many of the manufacturers are located in and around Kanpur the major purchase location for ordinance board. Most of these players supply sleeping bags based on tenders for purchases.

### ***Market size estimate***

Based on industry insights and information from key members of Ordinance factories, it is estimated that the total market size of sleeping bags in India is about 2.5 million units which is valued at Rs. 24 Crore.

Exhibit C-110: Market size estimate

	2012-13
Quantity (in million pieces)	2.54
Value (in Rs. Crore)	24.1

\*source: IMaCS analysis, industry sources

The market has grown at 4% per annum during the last five years, governed by the demand from armed forces. The basic mandatory requirement for provision of sleeping bag to every soldier and increasing deployment of soldier in extreme environments are two factors leading to the growth of the market.

### ***Key growth drivers and Inhibitors***

Key growth driver for sleeping bag industry is the consumption of sleeping bags by armed forces. Currently it is mandatory for all soldiers to have a sleeping bag. The replacement market for armed forces is the major demand for sleeping bags.

Lower preference for adventure sports like camping and mountaineering in India has kept the retail market demand lower. As a result most of the manufacturers produce sleeping bags only as per the tender requirements for the defence sector. A boost in adventure sports can be a real boon for the growth of retail market for sleeping bags. The market for sleeping bags is expected to grow at 8% per annum driven primarily by the growing armed forces of India.

### ***Key Manufacturers***

90% of the manufacturing units of sleeping bags are located in Kanpur including ordinance factory units. These players are SME and MSME units involved in production of sleeping bags, tents and tarpaulins mostly to cater the demand from Armed forces. The key players are:

- K C international
- Standard Newar Mills
- Tirupati Taxco Pvt. Ltd.
- Naveen Textile agencies
- R P industries
- Industrial Enterprisers

### ***Import export scenario***

Both import and export of sleeping bags have seen a decline over last five years since 2007-08. While imports have gone down marginally from Rs. 3 Crore to Rs. 1.5 Crore, there has been a substantial decline in exports of sleeping bags from India which has gone down to Rs. 11 Crore from Rs. 18 Crore declining at 12% per annum.

Exhibit C-111: Import trends

Applicable code family	HS	HS codes	2012-13
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<b>Imports</b>			
<b>9404</b>	94043010	Sleeping bag filled with feathers and down	Rs. 1.5 Crore
	94043090	Other sleeping bags	
<b>Exports</b>			
<b>9404</b>	94043010	Sleeping bag filled with feathers and down	Rs. 11 Crore
	94043090	Other sleeping bags	

*\*source: IMAcS analysis, DGFT, DGCIS*

### Quality Standards

The relevant Indian standards are IS 8991: 1978, JSS-8465-25:1997

## Sports nets

Sports nets are used in various sports like Badminton, Football, Basket ball, Volleyball, Tennis, Handball, etc. Nets are also used by cricket players in practices areas.

### Product Characteristics

The typical specifications of the various kinds of sports nets are given in the table below:-

Product features	Twine Size	Colour	Mesh opening size	Dimensions	Side & Bottom	Material of construction
<b>Badminton nets</b>	0.75mm	Black	20mm	24X2.5 ft	Black PVC tape (width 20 mm + 20 mm)	HDPE, P.P., Cotton & Nylon
<b>Tennis Nets</b>	3.5mm	-	45mm	42 ft x 4 Ft	Black vinyl coated fabric (width = 63mm + 63mm)	HDPE, UV heated-Machine knotted
<b>Volley Ball Nets</b>	3 to 4 mm	-	100 mm	9.5 Mtr x 1 Mtr	PVC coated fabric	HDPE, P.P., Nylon
<b>Football Nets / Soccer Goal Nets</b>	7 to 10mm	-	5 inch	24 x 8 x 6ft	-	HDPE, P.P., Nylon
<b>Handball Nets</b>	-	-	4 inch	2 x 3 x 1 mtr	-	HDPE & P.P.
<b>Cricket nets</b>	-	-	2 to 3 inches	100 x 10ft, 100 x 12ft, 100 x 15ft	-	HDPE & P.P.

The sports nets have an average GSM of 400 and typically cost Rs 250 per square metre.

### Market size and trade trends

The nets used in cricket, football and badminton account for majority of the domestic consumption. The market for sport-nets is driven by the development of sports in the country. In India, the investments in sports are very low as compared to other countries. Sports are regarded more as a leisure activity.

The end customers include various schools, colleges, universities, sports clubs and individuals. Sports nets are not purchased centrally by Sports Authority of India (SAI) as these are low cost items. The regional centres of SAI purchase the sports nets. Most of the purchase is done by institutional buyers.

The replacement market of sport nets is very small, with most organisations use a net for 9 t 10 years with repairs. The purchase demand is driven by various tournaments.

### ***Market size estimate***

Most of the sports net manufactured in India is being exported. The domestic market for nettings is relatively small and comprises of demand of nets for – volleyball, basket ball, tennis, cricket nets, goal post nets and table tennis nets mostly from schools and institutions in India. Along with it demands from sports clubs, sports associations are also significant part of domestic demand. The entire market in India is driven by exports with more than 80% of the production being exported. The total market for sports net is estimated to be Rs. 55 Crore.

**Exhibit C-112: Market size estimate**

	<b>2012-13</b>
<b>Quantity (in MT)</b>	700 MT
<b>Value (in Rs. Crore)</b>	Rs. 55 Crore

*\*source: IMAcS analysis, industry sources*

Market has mostly grown on account of growing exports which have grown at 38% during the last five years. The total market has grown at 32%.

### ***Key growth drivers and Inhibitors***

The market for sports net has been driven by growing exports. The domestic market is currently very small and is expected to grow at a decent rate due to growing sport events occurring across the nation. The export market on the other hand has been growing at a goods rate of over 20% during the last five years. Overall the market is expected to grow at 12% per annum in the next three years.

### ***Key Manufacturers***

Key manufacturers of sport-nets in India are Garware wall ropes and Kwalitiy Nets Manufacturing India Ltd.

### ***Import export scenario***

While the import of sport-nets in India remained insignificant, the export of sports net has grown by 38% to reach Rs. 47 Crore in 2012-13. The year was also very prestigious for Garware a wall rope, who was awarded for best performance in sports net exports by SGEPC.

Exhibit C-113: Import trends

Applicable code family	HS	HS codes	HS code description	(2012-13)
<b>Exports</b>				
<b>9506</b>		95069960	Sport nets	Rs. 47 Crore

*\*source: IMaCS analysis, industry sources, DGFT, DGCIS*

**Quality Standards**

The standards for different sports are governed by their respective governing bodies. There are no relevant standards for practice nets used in cricket.

## Sports foot wear components

Sports foot wear component includes shoe lining and shoe upper fabrics used in making of sport shoes. These fabrics are placed to provide comfort to the shoes by keeping it ventilated and moisture free.

### Product Characteristics

The technical textile components typically used in the sport shoes are as following:

- Shoe uppers made of PU/PVC coated/Laminated fabrics
- Linings on the counters and below the shoe uppers
- Others including non woven insoles, laces, tapes, labels, elastics, sandwiched meshes, etc

### *Product Characteristics*

The shoe upper material should have uniform thickness and colour and should possess water-proofing property. The desired characteristics of the shoe uppers are

- Breathability
- Dimensional flexibility
- Colour fastness
- Light weight
- Durability

The shoe uppers and linings account for 90-95 % of the technical textile components used.

### Market size and trade trends

Production of sport shoes in India is estimated to be about 317 million pairs<sup>7</sup> for 2012-13. Taking into consideration the average requirement of technical textile based shoe components – shoe uppers and shoe lining fabrics, as per the industry survey the total market for technical textile sport shoe components is estimated to be of 272 million sq. metres which is valued at Rs. 3700 Crore.

### *Market size estimate*

Based on inputs from industry and CLE, the total market for sport shoe components is estimated to be Rs. 3486 Crore. The table below gives the domestic production estimate for 2012-13 in India.

Exhibit C-114: Domestic production estimate

Product	2012-13	
	Quantity	Value
Sport shoes	634 million	

<sup>7</sup> Based on analysis of footwear production data from CLE

Product	2012-13	
	pieces	
<b>Sport shoe uppers</b>	146 mn. Sq. m	Rs. 2,477 Crore
<b>Sport shoe linings</b>	127 mn. sq. m	Rs. 950 Crore
<b>Total Production</b>		Rs. 3,428 Crore
<b>Total Market (Domestic +Export)</b>		<b>Rs. 3,486 Crore</b>

\*source: IMAcS analysis, industry sources

Indian sport shoe component industry has grown at 12% over the last five years. The growth of the industry is directly linked to the growth of footwear industry in India. The growth has been driven by the Women's sport shoe segment which has grown at 20% while men's sport shoe segment has grown by around 7%.<sup>8</sup> The growth has been mostly in the domestic market with little growth in exports. As per industry reports, the market is set to grow at around 12% in the coming five to ten years.

### ***Key growth drivers and Inhibitors***

Increasing income levels in the middle and lower middle class has been a major reason for the growth of footwear industry in India, which in turn drives the market for sport shoe components. Although the footwear industry of India has been growing at a considerable rate, the growth of sport footwear has been limited to just 7% in the men's segment and 20% in the women's segment. The prime reason is the price competitive market of India, where the organised footwear industry has just about 20% share. Rest of the 80% market is supplied by low cost economy shoes, the market of which is growing at over 30% per annum. Many of the manufacturers in the un-organised sector use low cost lower quality lining material and often rubber or PVC uppers to cut cost. This has prevented the market from reaching its full potential. Growth in the organised sector is expected to help the sport shoe component industry to grow to higher levels. The market is expected to grow at 12% during the coming three years.

### ***Key Manufacturers***

The manufacturing of sport shoe technical textile components is done mainly by small un-organised players in India. In addition, large players like Bata and Liberty which manufacture their own footwear components

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<sup>8</sup> Source: <http://www.browneandmohan.com/file3.pdf>

### Import export scenario

Import of technical textile sport shoe components has grown at 30% from Rs. 20 Crore in 2007-08 to Rs. 58 Crore in 2012-13. It is mainly driven by the growing foot wear industry of India. On the other hand the export of footwear components remains insignificant at Rs. 3 Crore for 2012-13.

Exhibit C-115: Import trends

HS code family	HS code description	Applicable HS codes	Import Value(E) (2012-13)	Export Value(E) (2012-13)
5603	MAN-MADE FILMNT WGHNG BETWN 70G/SQM AND 150G/SQM	56031300	Rs. 58 Crore	Rs. 3 Crore
	Non wovens & man made filaments weighing >150G/SQM	56031400		
	Nonwovens , other filaments weighing between 70G/SQM & 150G/SQM	56039300		
5903	Textile fabrics impregnated, coated, covered or laminated with plastics, other than Tyre cord fabric of high tenacity manmade yarn impregnated, coated, covered with PVC plastic, other fabric or other plastic	59031090 59039010 59039090		

\*source: IMAcS analysis, DGCIS, DGFT

### Quality Standards

There are no specific quality standards for shoe textile components.

## **High Performance Sports and swimwear**

### **High performance sports wear**

High performance sportswear includes clothing made of fabrics which could help out in playing a sport like breathable fabrics, moisture absorption fabrics and muscle relaxant fabrics. In India, mostly breathable moisture free fabrics are used as high performance sportswear. These products have the molecular property of drying away all the moisture generated by the body as sweat. This helps in reducing the fatigue while increasing the efficiency of the sports person, as otherwise constant friction between the body and sweaty wet fabric increases the amount of effort being put in by the sportsman. These products are being developed by top sporting brands like Adidas, Nike, Puma, Reebok, etc only. It is made out of breathable fabric.

### **High performance swimwear**

A swimsuit, bathing suit or swimming costume is an item of clothing designed to be worn while participating in water sports and activities such as swimming, water polo, diving, surfing, water skiing.

Men's swimsuit styles are swimming trunks such as board shorts, jammers, Speedo-style briefs, thongs, g-strings or bikini. Women's swimsuits are generally one-pieces, bikinis or thongs. The most recent innovation is the burin, a more modest garment designed for Muslim women; it covers the whole body and head (but not face) in a manner similar to a diver's wetsuit.

Special swimsuits for competitive swimming, designed to reduce skin drag. For some kinds of swimming and diving, special bodysuits called 'dive skins' are worn. Most competitive swimmers also wear special swimsuits including partial and full bodysuits, racer back styles, jammers and racing briefs to assist their glide through the water and gain speed advantages.

### **Market size and trade trends**

The market for high performance sportswear and high performance swimwear is still in a very nascent stage in India. At present only breathable active sportswear are being sold in the domestic market. With limited players offering the product, the market is limited to just a few thousand pieces. The market for high performance swimwear is catered mostly by the International brand of Speedo, whose products are sold by Page Industries Ltd in India.

### Market size estimate

Market size of high performance swimwear and sportswear has been estimated from the supply side taking into consideration, supply of major brands in India – Speedo, Reebok, Adidas, Puma and Nike.

Exhibit C-116: Market size estimate

	2012-13
Quantity (in nos.)	1500
Value (in Rs. Crore)	1.52

\*source: IMAcS analysis, industry sources

\*includes both high performance swimwear and high performance sportswear

### Key growth drivers and Inhibitors

The market for swimwear is growing at 20% per annum due to the changing lifestyle in India and coming of new residential societies with swimming pools. However, the market for speciality swimwear and sportswear is still limited to sportspersons. With growing of the affluence class and the growing interest of people in sports and leisure this segment is expected to grow. However, due to lack of awareness and price sensitivity of the market, the demand for speciality wears is not expected to grow in the coming few years. Although with the growing interest in Sports and focus of the government to promote sports in India is expected to act as a major driver for the industry. With the growing focus on sport events, the market of high performance swimwear and sportswear is expected to grow at 15% per annum.

### Key Manufacturers

Key manufacturers of speciality high performance sportswear and swimwear in India are the major sports brands - Page industries Ltd – having dealership for Speedo, Adidas India Limited and Reebok India Limited.

### Import export scenario

A table of current HS codes and import and export statistics

Exhibit C-117: Export Import trend

Applicable code family	HS	HS code description	HS codes	(2012-13)
<b>Imports</b>				
<b>6112</b>		men's/boy's swimwear of synthetic fibers	61123100	Rs. 9 Crore*
		swimwear of artificial fibres	61123920	
		swimwear of other fibers	61123990	
		women's/girls'	61124100	

Applicable code family	HS	HS code description	HS codes	(2012-13)
		swimwear of synthetic fibers		
		women swimwear of silk	61124910	
		women swimwear of artificial fibres	61124920	
		women swimwear of other fibres	61124990	
<b>6211</b>		SWIMWEAR FOR MEN'S OR BOYS'	62111100	
		SWIMWEAR FOR WOMEN'S OR GIRLS'	62111200	
<b>Exports</b>				
<b>6112</b>		men's/boy's swimwear of synthetic fibers	61123100	Rs. 3 Crore*
		swimwear of artificial fibres	61123920	
		swimwear of other fibers	61123990	
		women's/girls' swimwear of synthetic fibers	61124100	
		women swimwear of silk	61124910	
		women swimwear of artificial fibres	61124920	
		women swimwear of other fibres	61124990	
<b>6211</b>		SWIMWEAR FOR MEN'S OR BOYS'	62111100	
		SWIMWEAR FOR WOMEN'S OR GIRLS'	62111200	

source: IMAcS analysis, DGFT, DGCIS

\*Import & export figure for 2012-13 indicate all swimwear

### Quality Standards

There are no set quality standards for speciality swimwear and sportswear in India. However BIS has standards for sportswear fabric under IS 2150:1989 and IS 4375:1975.

## Tents

Different technical textile fabrics used in making of tents constitute the technical textile segment of tents and tent fabrics. These fabrics have technical characteristics of fire resistance or water proofing, temperature maintenance, etc. These tents are either laminated fabrics like PVC coated or and rubberized fabrics or made of technical textile fibres like breathable fabrics, high quality parachute fabrics, inherent fire retardant fabrics, etc.

### *Product Characteristics:*

Key characteristics preferable in tenting fabrics are:

- Water proofing
- Tear and abrasion resistance
- Wind proof
- Breathable
- Fire resistance
- Light weight
- High elasticity
- Better insulation

### *Classification and Applications*

Technical textile tents can be classified as under:

- **Arctic tents:** These are high performance tents used for extreme environment like high altitude and windy locations. In India most arctic tents are the most commonly used tents as it can be easily used at high altitudes and have a wide variety of technical characteristics as compared to other tents, which have limited technical characteristics and applications. Common application of such tents lies with the armed forces and mountaineering at high altitudes. These come in three sizes – small, large and medium. The size specifications for these are shown in the table below:

- **Extendable tents:** These are tents suitable for two to four persons at time made from two different layers of technical textile fabrics having properties of water resistance and higher insulation. These tents were first used during the Second World War, and ever since are frequently used by the Indian armed forces.
- **Swiss cottage tents:** Swiss cottage tents are luxury tents aimed at providing the experience of being close to the environment and nature. These tents are large tents with size ranging from 20 sq. m to 40 sq. m. These are mostly built with beautiful finish and designs. These are made from tear resistant canvas and are waterproof and resistant to extreme weather conditions.

Exhibit C-118: Types of technical textile tents

Sl. No.	Type of Tent	Size specification	Typical technical characteristics
1.	Small Arctic tent – MK2	2.1 X 1.9 sq. m	<ul style="list-style-type: none"> <li>• Waterproof and rot proof canvas</li> <li>• Dasootie lining for insulation</li> </ul>
2.	Medium Arctic tent – MK2	18.8 sq. m	<ul style="list-style-type: none"> <li>• Insulated outer layer</li> <li>• Fire proof inner layer made of parachute fabric</li> <li>• Rubberized fabric for flooring</li> </ul>
3.	Large Arctic tent – MK2	6.7 m X 9.8 m	<ul style="list-style-type: none"> <li>• Outer layer of water resistant duck cotton</li> <li>• Inner layer with Dosooti lining</li> </ul>
4.	Extendable tent – 2M	2.05 m X 4.65 m	<ul style="list-style-type: none"> <li>• Outer layer of water resistant duck cotton</li> <li>• Inner layer with Dosooti lining</li> </ul>

### **Raw Material**

Key raw material used in manufacturing of technical textile tents is mostly

### **Market size and trade trends**

. Although, the market for tents is very large especially with retail demand for different types of *shamiyanas* and tents for various occasions, the component of technical textile in these *shamiyanas* is absent. Key reason is lack of laws and guidelines for use of protective technical textiles, like fire retardant fabrics in these tents. As a result, many manufacturers in India prepare tents with normal cotton or canvas fabric which run the risk of catching fire easily. The market of technical textile tents is primarily governed by the demand from Indian armed forces, with small contribution for

mountaineering, camping needs and some technical textile *shamiyanas*. Indian armed forces account for close to 80% of the tent demand, due to its vast personnel deployment in active duty and exercises.

### **Market size estimate**

Based on the demand from Indian armed forces and insights from key players in the industry, the domestic market size of tents is estimated to be Rs. 103 Crore. The technical textile fabric in tents is estimated to be of 1561 MT which is valued at Rs. 62 Crore. With negligible import and export, the total market size of technical textile fabric in tents for 2012-13 stood at Rs. 62 Crore.

Exhibit C-119: Market size estimate

	2012-13
Quantity (in MT)	1561
Value (in Rs. Crore)	62

\*source: IMAcS analysis, industry sources

While the overall market has grown at 6% per annum for last five years since 2008-09, domestic demand has seen an upsurge and has grown at double the rate at 12% per annum. The market currently is driven by the requirement from armed forces and is expected to grow at a steady rate of 8% per annum.

### **Key growth drivers and Inhibitors**

Key growth driver is demand from the armed forces, which control the quality of output in the industry as well as determine the total production. Most of the manufacturers located in Kanpur which is the hub of tent making produce tent specifically for supplying to the defence forces. While usage in armed forces remains to be the major driver, establishment of norms and guidelines for use of fire resistant fabrics for tents and *shamiyanas* as a precautionary measure can be a big boost to the industry.

In addition to that, growth of adventure sports like camping and mountaineering would also help the industry grow although not in the same proportion as the above mentioned two drivers. A major hindrance in the growth prospect of tent industry is the declining exports.

The market for technical textile tent fabric is expected to grow at 8% during the coming years on account of increasing awareness about usage of fire retardant and coated tents. The usage from Indian armed forces is expected to be a major driver.

### Key Manufacturers

More than 80% of the manufacturers of tenting fabrics are present in and around Kanpur. These players are SME owner or MSME players, who do the regular business with ordinance boards for supply of tent fabrics, sleeping bags and work orders for ordinance factories. Key players in the tent industry are:

1. A V R enterprises
2. Standard Newar Mills
3. Tirupati Taxco Pvt. Ltd.
4. K C international

### Import export scenario

Import of technical textile tent fabrics in India is significant and has not any change in the last five years. Export of tents from India stood at 11.5 Crore showing insignificant growth from 2007-08. The export of technical textile fabrics – coated or laminated tents or tents made of special fabrics was Rs. 16 lakh for 2012-13

Exhibit C-120: Import trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Exports</b>			
<b>5407</b>	Bleached, unbleached, dyed, printed or other tents of cotton, jute, synthetic fibres or other materials	54071011 54071022 54071032 54071042 54071092	Rs. 0.16 Crore
<b>6306</b>	Camping goods of textile material	63062100 63062200 63062090 63069010 63069090	

\*source: IMAcS analysis, DGCIS

### Quality Standards

The quality standards applicable to the tent fabrics are shown in the exhibit below:

Exhibit C-121: Quality standards for Tents

Code	Description
IS 7609: 1988	General requirements for tents
IS 12989: 2000	Camping Tents

Code	Description
IS 12990: 1990	Camping tents - Requirements and test methods - Type L (Lightweight tents)
IS 12991: 2005	Textiles - Camping Tents and Caravan Awnings - Vocabulary and List of Equivalent Terms
IS 14445: 1997	Textiles - Fabrics for awnings and camping tents - Specification.
JSS: 8340-38: 2002 (Amds No 2)	Tent Extendable Frame Supported
JSRL 8340-01: 2000 (REV No. 1)	Tents
JSRL 8340-02:2004 (REV No. 1):	Poles Tent

## 6. Buildtech

The textile components and fabrics used in building and construction industry are called as building technical textiles or buildtech. These include products like tarpaulins which are used as roof coverings and architectural textile hangers and tensile structures amongst others.

### List of Products

The major products under the segment have been listed as under:

1. Architectural Membranes
2. Hoarding and signage
3. Tarpaulins – Canvas & HDPE
4. Awning and canopies
5. Scaffolding nets
6. Floor and wall coverings

### Market size and trends

The total estimated market size of Buildtech is around Rs.3,568 Crore with domestic market valued at Rs. 2,993 Crore. Domestic production caters to 84% of the market with imports catering to the other 16%.The product wise market size has been shown in the exhibit below.

Exhibit C-122: Market size estimation

Product	2012-13 (All figures in Rs. Crore)				
	Production	Import	Export	Domestic Consumption	Market size
Architectural Membranes	0	22		22	22
Hoarding & signage	263	224	2	485	487
Tarpaulin – Canvas	392	1	18	376	393
Tarpaulin – HDPE	1422	4	2	1424	1426
Awning & canopies	3	3	1	5	5.3
Scaffolding nets	10	0	0	10	10

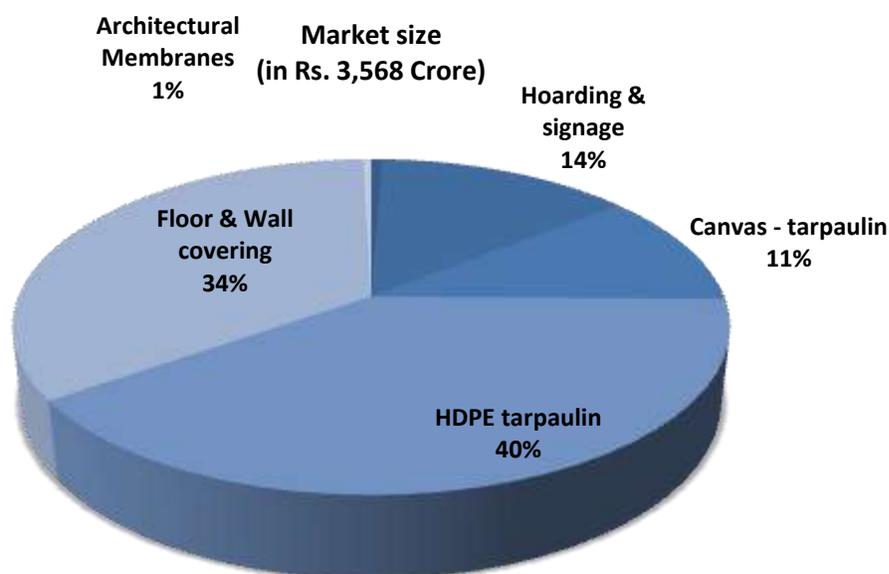
Product	2012-13 (All figures in Rs. Crore)				
	Production	Import	Export	Domestic Consumption	Market size
Floor & wall covering	918	307	552	673	1225
<b>Total</b>	3007	561	575	2993	3568

\*Source: IMAcS analysis

Market size calculated as exports + domestic market

The products which have the highest market shares in buildtech are floor and wall covering and HDPE tarpaulins. Products like Architectural membranes and scaffolding nets are still in their nascent stage in the industry and are expected to grow rapidly in coming years. Product segment wise market share has been shown in the exhibit below.

Exhibit C-123: Market size pie product wise



Source: IMAcS analysis

### Key Players

The key players of the segment have been listed as under:

- Responsive Industries Ltd.
- SRF Ltd.
- Royal Cushion Vinyl Ltd

- Premier Polyfilms
- Mehler Texologies
- Serge Ferrari Ltd.
- Gujarat Raffia industries
- Mafatlal Industries
- Binni Ltd.
- Rishi Techtex Ltd.
- Garware Wall ropes Ltd.
- Bharat Textiles
- Gokak Textiles

The detailed analysis of each product has been done in the subsequent sections.

## Architectural membranes

Architectural membranes are relatively new construction materials being used in India. The applications of architectural membranes include construction of permanent and semi-permanent structures such as car park covers, cafes, walkways, hotels, outdoor entertainment areas, pool surrounds, greenhouses, airports, stadiums, sports halls, exhibitions and display halls, storage bases for industrial and military supplies and any venues that require protection against harsh UV rays, heat, glare, rain and wind. The textile structures used for construction material can be classified into the following types:

- **Clear-span structures:** These structures provide a clear space beneath the fabric, free from supporting elements. Clear span structures are less permanent than air or tensile structures however, they accommodate doors, flooring, insulation, electricity and HVAC easily as compared to tents.
- **Tension structures:** In this structure, the fabric is supported by metal pylons, tensioning cables, wooden or metal frameworks. A relatively minimal rigid support system is required for these structures since the fabric carries most of the load.
- **Air Structures:** The main components of an air supported system are the envelope (fabric), inflation system (fans), anchorage system (cables and foundation), doors and access equipment. Air pressure inside the envelope provides tensioning and maintains required configuration and stability.

### *Product characteristics*

Architectural membranes are strong, energy efficient and aesthetically superior products that offer flexibility to designers and architects thus, allowing high levels of creativity. The textile material used for construction purpose is expected to be:

- Waterproof
- Fire retardant
- Resistant to deformation and extension under tension
- Impermeable to air and wind
- Resistant to abrasion and mechanical damage
- Resistant to sunlight and acid rain
- Resistant to microbial attack

Architectural membranes can be classified into two types:

**Permanent membrane structures:** These are high density tensile structures generally set up at long term projects like the ones at Jawaharlal Nehru Stadium in Delhi and the one at Mumbai Domestic Airport. These have a life of 25 to 30 years and as per building norms they are made of FR fabric. These are made of very high density fabrics having a GSM of around 470. With growing demand for landscaping, the market for permanent architectural membranes is growing in India at 7% per annum.

**Temporary Membrane Structures:** Temporary membrane structures are made of fabrics with density of around 270 GSM. These fabrics are used in making of artificial hangers at events like trade fairs, exhibitions, etc.

Depending on application, the fabric may need to transmit or reflect different levels of light. Commonly used coating for architectural membranes has been discussed as under:

- **PVC coated polyester**

PVC coated high tenacity polyester fabric with weight ranging from 600 gsm to 1100 gsm is used for construction applications. The polyester base cloth is used because of its durability, strength and relatively low cost. The base cloth is coated with PVC to impart the colour, strength and waterproof properties. PVC coating also allows adjoining panels of fabric to be seamed by high frequency welding.

Most architectural PVC coated polyester fabrics have some sort of top-coating on their exterior surface which improves the appearance of material, extends its life and allows self cleaning of material by rain water. Different types of top-coatings include acrylic solutions, PVDF solutions and PVF film laminations.

**Acrylic topcoat:** This is the most economical and most widely available finish. It gives a transparent glossy finish to the PVC. The acrylic coatings have a good resistance to UV degradation. It is a thin coating, thus, this material is easy to fabricate and repair. Acrylic top-coats give the material a ten-year lifespan depending on the ambient climatic conditions and air quality at the site where it is installed.

**Polyvinylidene fluoride topcoat:** This finish offers resistance to UV degradation, atmospheric chemical attack, algae and fungal attack thus, is far superior to the acrylic topcoat. These properties result in a membrane lifespan of 15 to 20 years depending on site conditions. Like acrylic top-coats, they are highly flexible and resistant to cracking, making them easy to handle during installation. Though, owing to chemical-resistant properties of PVDF the finished top-coated material cannot be welded. The top-coating must be abraded off to effect welding which increases the cost of fabrication and involves risk.

**PVDF/PVC top-coating:** This is effectively a dilution of the PVDF topcoat; the finished fabric is weldable thus, offering saving in fabrication costs. Fabrics with this coating have a life expectancy of 10 to 15 years, depending on prevailing conditions.

**Pedlar top-coating:** Pedlar is the trade name for polyvinyl fluoride (PVF). This is a film-layer that is laminated to the fabric during manufacture. This results in a thicker finished fabric that is more resistant than its competitors to weather and chemical attack. It has superior self-cleaning capabilities than the PVDF range of top-coatings and resists attack from graffiti, acid rain and bird droppings. For this reason it is frequently specified for use in highly industrialized areas, high saline coastal zones and desert environments. Having a thicker coating, it erodes at a much slower rate giving it a life expectancy of about 25 years depending on conditions.

The Tedlar film renders the PVC sheet non-weldable. This problem is overcome by butt welds. Tedlar top coated material is comparable in price to PVDF but substantially less costly than PTFE coated glass fibre.

- **Polytetrafluoroethylene (PTFE) coated glass fabric**

PTFE coated glass fabric is a frequently specified material due to its life expectancy of 30 years, depending on conditions. The woven fibreglass is incombustible, strong and does not undergo significant stress relaxation. The PTFE or Teflon coating is incombustible and has good self-cleaning ability. Fabrication of a PTFE membrane requires slow and specialized welding techniques under controlled environmental conditions. It also requires extra care in handling and packaging due to susceptibility to cracking and self-abrasion. These properties contribute to its high cost and to the need for additional tensioning hardware for the finished fabric structure. The tensioning of PTFE glass fabric is a slow process, as it requires incremental adjustment over long periods of time on site. This factor also contributes to its higher cost.

However, due to cost factors, most of the architectural membranes used in India are made of PVC coated fabrics.

### **Market size and trade trends**

In India, stadiums, airports, restaurants, hotels, residential complexes and shopping malls account for majority of application of architectural membranes. According to industry experts, tensile structures are now well accepted by the architects and builders on account of their light weight, aesthetic superiority and the design flexibility offered by the product. The market for architectural membranes is at a nascent stage for permanent structures. The market for permanent structures is estimated to be around 1.25

lakh sq. metres in India. On the other hand the market for temporary structures is slowly catching up with many exhibitors now preferring hangars and shades made of these structures to host events. Due to its cheaper costs, these structures have a big replacement market. The current market for temporary architectural structures in India is estimated to be around 3 lakh sq. metres.

### **Market size estimate**

The market for architectural membranes is estimated to be of Rs. 22 Crore in India worth 4.25 lakh sq metres of fabric. Market has grown at 8% per annum for last five years since 2007-08 on account of growing domestic demand. While demand for temporary structures used as hangars for conducting exhibitions is a major driver.

Exhibit C-124: Market size estimate

	2012-13
<b>Quantity (in Lakh sq. m)</b>	4.25
<b>Value (in Rs. Crore)</b>	22

\*source: IMAcS analysis, industry sources

### **Key growth drivers**

Growing demand for temporary architectural structures would be the biggest driver for the industry in the future. Due to its quick replacement and growing scale of events and exhibitions occurring in India, the demand for these structures would go up by 10% per annum. On the other hand with growing awareness and the focus of design and aesthetics, the market for permanent structures are expected to grow at 5% driven primarily by growing infrastructure development and corporate building constructions in India. Overall market is expected to grow at 8% per annum.

### **Key Manufacturers**

The market of architectural membranes is entirely catered through imports.

### **Import export scenario**

The market is catered mainly through imports from Germany and France. Mehler Texologies, is the largest importer of architectural membrane in India importing from its Germany. Other than Mehler, Serge Ferrari is a French company providing architectural membrane solutions in India. These two companies together cater to close to 90% of the industry demand. In addition to it, Hira Oka is a Japanese tensile structure provider catering to the Indian market.

Exhibit C-125: Export Import trends

HS code family	Applicable HS codes	2007-08	2012-13
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HS code family	Applicable HS codes	2007-08	2012-13
<b>Imports</b>			
<b>3921 &amp; 3926</b>	39219099 39269029	Rs. 15 Crore	Rs. 22 Crore

*\*source: DGCIIS, IMAcS analysis, Industry sources*

### Quality Standards

The parameters tested by Indian manufacturers for tensile membrane along with the test methods are mentioned in the table below:

Parameter	Test Method
Fire resistance testing	BS 3119
Physical Testing	IS-7016
Tearing Strength (Tongue Tear)	BS-3424 7A
Resistance to Heat & Loss of Mass	IS: 1259
Water Repellency	IS-390

*Source: Industry survey*

The desired properties depend on the end application and desired life of the tensile structure.

## Hoarding and signage (Flex)

Hoardings / Signage are made of a translucent flexible textile substrate called flexible-face sign fabric. Flexible-face sign fabric, also known as flex was developed as an alternative to rigid-faced substrates like acrylic, plastic and polycarbonates. Besides hoardings, this material has applications in light boxes, exhibits, trade show displays and majority of other static out of home (OOH) advertising.

Flex is preferred over its rigid counterparts since the material offers flexibility in taking on graphics. It is amenable to screen printing, inkjet printing or painting, thus opening up more channels of creativity. As a result, print consistency can be maintained across locations. It is possible to produce large seamless signage using flex. Since this material is designed to withstand winds of speed 110 to 140 miles per hour, it is ideal for huge billboards on the expressways and national highways. Moreover, it can be easily transported because of its light weight and ease of handling.

### *Product characteristics*

Flex is made of a PVC coated polyester warp knitted fabric. The fabric is made from high tenacity polyester filament yarn of denier ranging from 250 to 500. This fabric is coated with PVC and surface treated with lacquer. The material has the following properties:

- Light transmission
- Printability
- Ultra Violet resistance
- Heat Seal ability
- Mildew resistance
- Anti wicking

Flex is available in different varieties depending on its application. The flex used for front-lit hoardings is available in GSM ranging between 280 and 370 and that for back-lit hoardings is available in GSM ranging from 450 to 650.

### Market size and trade trends

Flex is the most preferred material for hoardings / signage and other static OOH media. As per a FICCI report on Indian advertising industry, bill boards and hoardings contribute to about 60% of the OOH advertising industry. OOH media has assumed great significance because of considerable shift in consumers' lifestyles and suburban growth. Consumers spend an average of four hours a day travelling, shopping and eating at out-of-home areas like airports, shopping malls, restaurants and multiplexes

which has resulted in increased importance of OOH media at these spaces. OOH industry is expected to account for 70% of the total usage of flex fabric as hoarding and signage. In addition to the OOH advertising industry, flex have also used extensively for promotion during public events, exhibitions, trade fairs, local advertising and advertising on vehicles – trains, buses, etc. OOH

Hoardings are facing resistance because of potential traffic hazards as well as environmental hazards, specifically in large. On the other hand, new/refurbished airports, highways, street furniture and mushrooming retail space present opportunities for significant growth. Though the use of digital media i.e. LCD, LED is expected to reduce the share of static advertising, the rate of adoption of digital media is slow. Thus, flex is expected to continue as preferred media for the OOH advertising industry.

The average price of getting a front led printed flex fabric is Rs. 9 per sq. ft.

### ***Market size estimate***

The market of flex fabric usage as hoarding and signage is estimated using the supply side inputs from key manufacturers in India like SRF and the growth of OOH industry in India. The estimated market size for 2012-13 is Rs. 487 Crore which is valued at 164 million sq. metres.

Exhibit C-126: Market size estimate

	2012-13
<b>Quantity (in million sq. m)</b>	164
<b>Value (in Rs. Crore)</b>	487

*\*source: IMAcS analysis, industry sources*

Market has grown at 30% per annum for last five years since 2007-08 on account of growing preference of flex banners for bill boards. The market is expected to grow at 5% to 7% per annum during the coming five years. With coming of Indian manufacturers, in the industry the share of Chinese imports which once ruled the market has gone down to 50% of the market. The market is expected to grow at 12% in the coming three years, driven mainly by the OOH industry.

### ***Key growth drivers and Inhibitors***

Growth of the bill board OOH advertising would be the key for the growth of the industry. In the last five years, the use of flex fabric has made a very significant penetration in the bill board market with close to 95% of bill boards today using flex fabric, which led to goods growth rates. In the coming years, the growth of the industry would be dependent on the growth of the bill board industry which is expected to grow at 8.4% and the usage for small publicity events which is increasingly using flex fabric over other alternatives. The market is set to grow at 12% per annum in the next three years.

### Key Manufacturers

SRF Limited is the largest manufacturer of coated flex fabric in India accounting for more than 50% of Indian production. In addition to it, there are many coated fabric players in the country in SME and MSME segments that are involved in production of flex fabric in small quantities.

### Import export scenario

India is a big importer of flex fabric most of which come in from China. Total import of flex in India has grown at 6% during the last five years reaching Rs. 224 Crore for 2012-13

Exhibit C-127: Export Import trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>3920</b>	Plates, sheets etc. of polymers of styrene nes	39201019	Rs. 224 Crore
	other plates sheets of polymer of vinyl chloride	39203090	
	sheets of ploy-methyl meth-acrylate flexible plain	39204900	
	poly acrylate sheets rigid, plain	39205112	
	poly acrylate sheets other	39205911	
	other of poly (vinyl butyral)	39205919	
	plates sheets films foil and strip of poly (vinyl acetate) nes	39209119	
	plate sheet film foil and strip of co-polymer of vinyl chloride and acetate other	39209919	
	others plate/ sheets etc. of other plastic n.e.s	39209939	
plates sheets etc. of polymers of styrene nes	39209999		
<b>3921</b>	plates etc of polymers of vinyl chloride	39211200	
	other plates sheets etc of other plastics cellular	39211900	
	other plates, sheets, film foil, strip etc, of polymer of vinyl chloride : other	39219020	
	other plates, sheets, film foil, strip etc nes flexible, laminated	39219096	
	other plats, sheets, film foil, strip etc nes other	39219099	
<b>4911</b>	Posters- printed	49111010	
	other advertising matter printed	49111090	
	others	49111990	
<b>5903</b>	other fabric impregnated, laminated plated and coated with PVC	59031090	
	other fabrics impregnated laminated plated and coated with polyurethane	59032090	
<b>Others</b>	poly (vinyl chloride) resins	39042110	
	other self-adhesive plates etc nes	39199090	

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HS code family	HS code description	Applicable HS codes	2012-13
	other article of plastic nes	39269099	
<b>Exports</b>			
<b>3920</b>	other sheets of poleythylene	39201019	Rs. 2.4 Crore
	plates sheets etc. of polymers of styrene nes	39203090	
	other plates sheets of polymer of vinyl chloride	39204900	
	sheets of ply methyl methacrylte flexible plain	39205112	
	poly acrylate sheets rigid, plain	39205911	
	poly acrylate sheets other	39205919	
	other of poly (vinyl butyral)	39209119	
	plates sheets films foil and strip of poly (vinyl acetate) nes	39209919	
	plate sheet film foil and strip of copolymer of vinyl chloride and acetate other	39209939	
others plate/ sheets etc. of other plastic n.e.s	39209999		
<b>3921</b>	plates etc of polymers of vinyl chloride	39211200	
	other plates sheets etc of other plastics cellular	39211900	
	other plates, sheets, film foil, strip etc, of polymer of vinyl chloride : other	39219020	
	other plates, sheets, film foil, strip etc nes flexible, laminated	39219096	
	other plats, sheets, film foil, strip etc nes other	39219099	
<b>4911</b>	Posters- printed	49111010	
	other advertising matter printed	49111090	
	others	49111990	
<b>5903</b>	other fabric impregnated, laminated plated and coated with PVC	59031090	
	other fabrics impregnated laminated plated and coated with polyurethane	59032090	
<b>Others</b>	poly (vinyl chloride) resins	39042110	
	other self-adhesive plates etc nes	39199090	
	other article of plastic nes	39269099	

\*source: DGFT, industry, IMAcS Analysis, DGCS

### Machinery details

The process of manufacturing flex involves coating the base fabric with PVC emulsion by either dip or knife roll method followed by drying and curing. Drying and curing of the chemicals applied to the substrate is accomplished by means of heat wherein the fabric is passed through an oven with continuous circulation of hot air.

The domestic manufacturers/suppliers of coating lines are:

- ATE Pvt. Ltd

- Harish Enterprises
- Kuster Calico Machinery Ltd.
- Shreeji Engineering and Marketing Services
- Stovec Industries Ltd.

**Quality Standards**

There are no quality standards available for this product.

## Tarpaulins - Canvas & HDPE

A **tarpaulin** or **tarp** is a large sheet of strong, flexible, water resistant or waterproof material. Traditionally tarpaulins were made out of cotton however currently nylon and polyester fibre fabrics are being increasingly used in manufacturing tarpaulins.

Tarpaulin is widely used for rain water protection in sheds, transportation - trucks & other automobiles, storage godowns, boats, snowmobiles, construction sites, lumber, grain storage, temporary storages, tents, ground-sheets, etc.

Tarpaulins are categorized as given below:-

1. Cotton canvas tarpaulins
2. HDPE/PP/Nylon tarpaulins

Tarpaulins are sheets made out of polyethylene, cotton canvas, jute, etc. Polyethylene tarpaulin is also known as HDPE Tarpaulin, Laminated Tarpaulin, Plastic Tarpaulin, etc. Traditionally, cotton canvas had been the more common form of tarpaulins, but, lately, HDPE woven and laminated fabric and polyethylene sheets have replaced canvas in many of the applications.

### Canvas Tarpaulin

Canvas tarpaulins are largely used as truck covers. Trucks travel long distances and hence come across huge climatic variations. Given India's rough environmental conditions, damage to goods is inevitable if the goods are not adequately shielded. A steel body truck not only increases the weight of the truck but also reduces the fuel efficiency. Thus, truck tarpaulin covers are widely used as truck covers. As the logistics industry is getting more and more organised, the product liability clauses are being enforced on the logistics players leading to increase in usage of truck covers. Moreover, the advent of organised players in retail industry has also given boost to the use of well covered trucks.

### *Product Characteristics*

Canvas Tarpaulin covers are made of cotton canvas or nylon or polyester fibre fabrics coated with PVC. The cotton fabric is available in GSM ranging from 380 to 500. Vinyl coated polyester fabrics are 610 GSM to 678 GSM with the base fabric of 102 GSM to 107 GSM. These fabrics being heavy have lower elongation, minimum shrinkage over wide range of temperature and humidity conditions and resistance to UV degradation

### **Market size and trade trends**

The key application of canvas tarpaulins is as truck covers. In India, road is the dominant mode of transportation carrying almost 65% of the country's freight. Truck transport accounts for majority of the goods transfer through road and thus, holds immense significance. Around 3.1 lakh new trucks are sold in 2012-13, increasing at 16% y-o-y for the last four years. Each truck requires about three to four tarpaulins, one to two out of which is generally of canvas. An average canvas is of 70 sq m and has a life of 18 months. The market size for canvas tarpaulins has been estimated using the demand from HCV – trucks and buses. The sale figures for HCV and buses are as shown:

**Exhibit C-128: Sale of MCVs in India**

	2012-13	2011-12	2010-11	2009-10
M & H goods carrier sales (in Lakh nos.)	3.17	3.30	2.91	2.04
M & H Passenger carrier sales ( in Lakh nos.)	0.53	0.54	0.54	0.46

*\*Source: SIAM*

### ***Market size estimate***

The total domestic market size for canvas tarpaulins in India is estimated to be of 34 million sq. metres amounting to Rs. 375 Crore.

**Exhibit C-129: Market size estimate**

	2012-13
<b>Quantity (in million sq. m)</b>	34
<b>Value (in Rs. Crore)</b>	393

*\*source: IMaCS analysis, industry sources*

The domestic market for tarpaulin has been declining due to increasing preference for HDPE tarpaulins which are not only cheaper but also water proof. The domestic market has dropped at 5% y-o-y, while exports have increased at 33% to reach Rs. 17 Crore.

### ***Key growth drivers and Inhibitors***

Usage by the trucking industry which accounts for a major demand for canvas tarpaulins remains to be the major growth driver for canvas tarpaulins. The market for tarpaulins is expected to decline at 5% per annum owing to increasing replacement by HDPE tarpaulins.

### Key Manufacturers

Key manufacturers of canvas tarpaulins in India are Gokak textiles, SRF limited and Bharat textiles. The industry is highly fragmented with many players in the un-organised sector. Key manufacturers of canvas tarpaulins are:

- Shri Arjun Tarpaulin industry – Salem
- Dehli Tirpal House – New Delhi
- Calcutta canvas Company – Chennai
- Daisy trading company – Mumbai
- Lamifab Industries - Mumbai

### Import export scenario

India imports of canvas tarpaulin in very small at just Rs. 1 Crore. However, India has slowly grown as a supplier of tarpaulins with the exports going up from Rs. 5 Crore to Rs. 17 Crore in last five years

Exhibit C-130: Export Import trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5901</b>	Prepared painting – canvas	59011020	Rs. 1 Crore
<b>5907</b>	Other textile fabrics	59070099	
<b>6306</b>	Jute tarpaulins	63061910	
	Tents of other fabrics	63062910	
<b>Exports</b>			
<b>5901,</b>	Prepared painting – canvas	59011020	Rs. 17.5 Crore
	Other textile fabrics	59070099	
<b>6306</b>	Jute tarpaulins	63061910	
	Other tents	63061990	
	Tents of other fabrics	63062990	

\*source: DGFT, industry, IMAcS Analysis, DGCI

**Machinery details**

The domestic manufacturers/suppliers of coating lines are:

- ATE Pvt. Ltd
- Harish Enterprises
- Kuster Calico Machinery Ltd.
- Shreeji Engineering and Marketing Services
- Stovec Industries Ltd.

## HDPE Tarpaulins

Polyethylene tarpaulin is also known as HDPE Tarpaulin, Laminated Tarpaulin, Plastic Tarpaulin, etc. Polythene Tarpaulins are made of High Density Polythene woven fabric laminated on both sides with low density polythene. The advantages of PE tarpaulins are that they are very economic compared to cotton canvas tarpaulins. PE tarpaulins with HDPE woven fabric and LDPE lamination on both the sides are 100% waterproof. PE tarpaulins have the capability to adopt wide range of colours unlike the canvas tarpaulin which makes it more usable and a preferred product all over the world.

### Product characteristics

The polyethylene tarpaulin usually ranges from 70-500 gsm. The most popular characteristics in tarpaulins are listed below:

Parameter	Characteristics
<b>GSM</b>	: From 100 to 350 gsm
<b>Mesh</b>	: From 8 X 8 to 14 X 14
<b>Denier</b>	: From 700 up to 1200
<b>Width</b>	: 6ft and above
<b>Length</b>	: 6 ft and above
<b>Lamination</b>	: LDPE Lamination on both sides
<b>Color</b>	: Blue, Yellow, Black, Silver/Blue, Silver/White, Silver/Black

The density of tarpaulin depends on the layers. A three layer tarpaulin can have density from 72 GSM up to 200 GSM and a five layer tarpaulin, it can go up to 300 GSM, giving it higher strength and durability. HDPE tarpaulins are generally available in standard sizes of 15ft X 12ft, 18ft X 12ft, 18ft X 15ft, 24ft X 18ft, 24ft X 16ft and 30ft x 30ft. UV stabilization can also be done on the tarpaulin.

### Market size and trade trends

HDPE tarpaulins finds application in a number of industries like for truck tarpaulins, raffia industry and for water proof covers for tents and other outdoor arrangements.

#### *Market size estimate*

HDPE tarpaulins are a major part of the raffia industry. The domestic market of HDPE tarpaulins is estimated to be 1.29 lakh MT worth Rs. 1424 Crore in 2012-13 with exports worth Rs. 2 crore. The total market size is estimated to be Rs. 1426 crore

Exhibit C-131: Domestic Market size estimate

	2012-13
Quantity (in '000 MT)	129
Value (in Rs. Crore)	Rs. 1426 Crore

\*source: IMAcS analysis, industry sources

### Key growth drivers and Inhibitors

The market of Tarpaulins is dependent on user industries like trucking and raffia industry. While the trucking industry is growing at 16%, raffia industry is expected to grow at around 8% in the coming years. These would be main drivers for demand of HDPE tarpaulins. The market is expected to grow at 10% per annum.

### Key Manufacturers

Key manufacturers of HDPE Tarpaulins are:

- Gujarat Craft
- Gujarat Raffia
- Binni Limited
- Mafatlal Industries Ltd.

### Import export scenario

India does small foreign trade in HDPE tarpaulins. The export of

Exhibit C-132: Export Import trends

HS code family	HS Code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>3926</b>	Other articles of plastic	39269099	Rs. 4.2 Crore
<b>6306</b>	Tarpaulins, etc of synthetic fibres	63061200	
	Others	63061990 63062990	
<b>Exports</b>			
<b>3926</b>	Other articles of plastic	39269099	Rs. 2.2 Crore
<b>6306</b>	Tarpaulins, etc of synthetic fibres	63061200	
	Others	63061990 63062990	

\*source: DGFT, DGCIIS IMAcS Analysis

### **Machinery details**

The main machine required for tarpaulin manufacturing is the 8-10 Wide width Shuttle Loom. The main suppliers of these looms in India are:

- Lohia Starlinger Limited
- J. P. Industries
- Kabra Extrusiontechnik Ltd. (KET) – Kolsite
- Windsor Machines Limited

### **Quality Standards**

IS 7903:2005 is the standard applicable to HDPE tarpaulins

## **Awnings and Canopies**

An awning is a secondary covering attached to the exterior wall of a building. With the addition of columns an awning becomes a canopy, which is able to extend further from a building, as in the case of an entrance to a hotel.

The location of an awning on a building may be above a window, a door, or above the area along a sidewalk. Restaurants often use awnings broad enough to cover substantial outdoor area for outdoor dining, parties or reception. In commercial buildings, an awning is often painted with information such as the name, business, and address, thus acting as a sign or billboard in addition to providing shade from the sun, break from steep winds and protection from rain or snow. The key benefits of an awning or a canopy are weather protection, decoration and identification.

An awning fabric gives an extremely high level of protection from UV radiation. This degree of protection depends on the colour of the fabric. Lighter colours let more UV light through than the dark colours, but they remain as effective as a factor 50 sunscreen (filtering out more than 90% of UV radiation).

### ***Product characteristics***

The fabric for awnings & canopies usually varies from 400-700 gsm, though it can also be higher depending upon the fabric used. Advantages of Awnings and canopies are as shown under:

- Weather protection
- High tear strength
- Long lasting
- Good breaking strength
- Does not get warped
- Weld able
- Good drape
- Aesthetic appeal combined with strength

## Market size and trade trends

### *Market size estimate*

The market of awnings and canopies has been estimated based on inputs from key players. The total market for awnings and canopies is shown in the table below.

**Exhibit C-133: Domestic Market size estimate**

	2012-13
<b>Quantity (in million sq. m)</b>	0.35 million sq. m
<b>Value (in Rs. Crore)</b>	Rs. 5.3 Crore

*\*source: IMAcS analysis, industry sources*

The market for awnings and canopies has grown on account of increasing usage by Indian shop keepers and growth in exports.

### *Key growth drivers and Inhibitors*

Growth in the real-estate segment especially hotels, fast food places, sale counters, etc is driving the usage of awnings and canopies in India. The export of awning and canopies from India is growing over the last five years. Seeing the export trend and the growing requirement from high end retail and restaurants, the market is expected to grow at 20% during the coming three years.

### *Key Manufacturers*

SRF and Entremont Polycoaters are the key players in the awning fabric market in India. There are also few other players like Coated Sales Corporation and Alps Industries who manufacture awning fabrics.

### *Import export scenario*

The import of awning and canopies in India has increased over years. Yet due to the specialised nature of the product, the total market for foreign trade remains small.

**Exhibit C-134: Export Import trends**

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>3926</b>	other article of plastic nes	39269099	Rs. 2.8 Crore
<b>5407</b>	other woven fabrics from strip/the like	54072090	
<b>5512</b>	woven fabric, other containing acrylic/mod-acrylic >=85%	55122990	
<b>6306</b>	Others	63061990	

HS code family	HS code description	Applicable HS codes	2012-13
<b>Exports</b>			
<b>3926</b>	other article of plastic nes	39269099	Rs. 0.8 Crore
<b>5407</b>	other woven fabrics from strip/the like	54072090	
<b>5512</b>	woven fabric, other containing acrylic/mod-acrylic >=85%	55122990	
<b>6306</b>	Others	63061990	

\*source: DGFT, DGCIIS IMaCS Analysis

The key importers of awning fabric are:

- Systems India Pvt. Ltd – Authorised for Dickson & KITEX (Korea PVC awning)
- Mac Décor Ltd.
- Sujan Impex, Mumbai – Authorised for Serge Ferrari – French company

### Machinery details

Key machinery suppliers for making of awning fabrics and awnings are:

- Yamuna Industries, Umbergaon
- Swatik Industries, Ahmadabad
- Shakti Industries, Mumbai
- Web Processing, UK
- Coatema, Germany
- Zimmer, Germany

## Scaffolding nets

Scaffolding netting is a lightweight fabric used to cover a building under construction in order to improve the safety of construction site. It acts as a bi-fold barrier on a building under construction. The net prevents debris from falling out of building and also hides away unsightly work areas giving a tidier look.

### *Product characteristics*

Scaffolding nets are knitted from High Density Polyethylene (HDPE) UV stabilized monofilament yarn. The UV stabilizers added to HDPE develop resistance to UV rays thus, increasing the product life. Scaffolding nets are available in different weights and shading factors ranging from 50% to 90%. These nets are low GSM products with GSM of around 270.

### Market size and trade trends

Scaffolding nets are used to cover scaffoldings used in construction of the building. These are mostly used in making of bridges and large commercial and residential buildings. However, although the awareness for the product has increased over years, the market penetration is still very low and very limited builders mostly in the metro cities use scaffolding nets. As per market insights scaffolding nets contribute to about 20% of the total cost of using scaffolding with scaffolding net.

### *Market size estimate*

Estimating the size of scaffolding requirement using the total real-estate construction going in India, the market of scaffolding net is estimated to be Rs. 10 Crore. The market has grown on account of increase in awareness of benefits and increased usage in metro cities.

**Exhibit C-135: Domestic Market size estimate**

	2012-13
<b>Quantity (in million sq. m)</b>	6.7
<b>Value (in Rs. Crore)</b>	Rs. 10 Crore

*\*source: IMAcS analysis, industry sources*

### *Key growth drivers and Inhibitors*

The growing awareness about use of scaffolding nets for construction is the major driver for the industry. The use is mostly for construction of high rise buildings in the metro cities. Hence the growth of real-estate construction in the key metros would be the major growth driver along with increasing preference for these nets. Secondary drivers would be construction of infrastructure projects like

bridges. With wide spread awareness in the metro cities and regular use by construction companies, the market is expected to grow at a high rate of 12% per annum during the coming three years.

### ***Key Manufacturers***

Scaffolding nets in India is mainly manufactured by the large netting companies like Garware Wall ropes, Rishi Techtex Ltd., Safe nets, Kwality Nets Manufacturing Co. Pvt., Ltd. and Netlon Ltd. However, the manufacturing of scaffolding nets is a very small part of their overall netting business.

### ***Import export scenario***

There is very little foreign trade of scaffolding nets in India with both imports and exports of less than Rs. 1 lakh

### **Machinery details**

Scaffolding nets are knitted from High Density Polyethylene (HDPE) UV stabilized monofilament yarn. The UV stabilizers added to HDPE develop resistance to UV rays thus, increasing the product life.

The raschel knitting machines used for manufacturing nets are mostly imported. GCL India Pvt. Ltd (Bangalore) is one of the local manufacturers of raschel knitting machines. The key raschel knitting machinery manufacturers in the world are Karl Mayer (Germany), LIBA Maschinenfabrik GmbH (Germany) and Brückner Technology Holding GmbH (Germany).

The Indian associates/suppliers of these machinery are:

- ATE engineering (Mumbai) for Karl Mayer
- Brückner Machinery and Service India Pvt. Ltd (Pune) for Bruckner.

### **Quality Standards**

There are no available quality standards for scaffolding nets.

## Floor and Wall coverings

Floor & Wall covering items can be classified as following:-

- PVC flooring & Printed PVC flooring
- Non-woven carpets
- Woollen carpets
- Carpets / floor coverings of polypropylene, polyester, etc

Floor coverings have been mostly dominated by wool, polypropylene and acrylic carpets. But, as consumers began to look for affordable carpets that were easy to care and maintain at home, the trends started shifting towards polyester. Distinct advantages such as higher bulk, strength, resilience, colour, clarity, fastness, easy care, affordability and longevity have fuelled the demand for polyester carpets. Nowadays, non-woven needle punched wall-to-wall carpets are also being used widely. Wall to wall carpets provide a dust free environment and serve as good insulators against noise. With the boom in IT industry and commercial establishments, wall to wall carpets are in demand in India too.

### *Product characteristics*

Vinyl flooring is produced in a variety of designs i.e. mosaic, ceramic, wood, marble, floral, granite, geometric pattern etc. to suit different applications in Home, Hotels, Hospitals, Offices, Nursing Homes, Airport, Bank, Computer Rooms, Railways, Restaurants, Shopping Complexes, etc. Commercial flooring in 2mm thickness is designed to suit medium and heavy traffic areas like Hospitals, Offices, Airports, Shopping Complexes, Railways, Libraries, etc.

The different ranges of Floor and wall coverings and their applications are:-

- 1 mm thickness: Can be used in Residential Areas & Study Centres.
- 1.5 mm thickness: Computer Rooms, Departmental Stores,
- 2 mm thickness: Industrial Areas & Electronics Rooms

The non-woven wall-to-wall carpets and floor coverings are also increasingly being used in India. These carpets are made of PP and are tufted.

### **Market size and trade trends**

Indian market of floor and wall covering is mostly controlled by vinyl coverings and other textile matting and wall coverings. These products are now extensively being used by the commercial and infrastructure sectors at Hotels, restaurants, Commercial real-estates, major outlets, hospitals and Airports. Due to better aesthetics and lower awareness of these products, the share of organised sector is very high in the industry. The market is constituted mainly by a few major players with Responsive industries being the leader in the segment. The domestic usage of the floor and wall coverings has been estimated based on discussion with the industry players and published information about the production and sales of the key players in India as well as the imports and exports statistics.

### ***Market size estimate***

The total market of floor and wall coverings in India including export is estimated to be of Rs. 1225 Crore, with domestic market of Rs. 702 Crore and export market of 522 Crore.

**Exhibit C-136: Domestic Market size estimate**

	<b>2012-13</b>
<b>Quantity (in million sq. m)</b>	153
<b>Value (in Rs. Crore)</b>	Rs. 1,225 Crore

*\*source: IMaCS analysis, industry sources*

The market has grown at 10% during the last five years mainly driven by the growing domestic demand which has grown at 13% over the last five years. Exports on the other hand have grown at a relatively slower pace at just 5%.

### ***Key growth drivers and Inhibitors***

Indian market of floor and wall covering is mostly controlled by vinyl coverings and other textile matting and wall coverings. These products are now extensively being used by the commercial and infrastructure sectors at Hotels, restaurants, Commercial real-estates, major outlets, hospitals and Airports. Increasing use of these products and growing preference for decorative and better aesthetics which in turn is driven by the growing living standards in India. The preference of vinyl floor covering and wall coverings especially in commercial and office establishment is expected to drive the domestic market at a high rate. This along with the growing exports is expected to drive the market at 10% per annum during the coming three years

### Key Manufacturers

Responsive Industries Limited is the largest player in the segment with a production of close to 20,000 million sq. mtrs. Other key players in the industry are:

- Premier Polyfilms Ltd.
- Uniproducts India Ltd.
- Royal Cushion Vinyl Products Ltd.
- Birla Corporation

### Import export scenario

India is a leading exporter of floor and wall coverings. The total exports have grown by 5% over the last five years to reach Rs. 552 Crore. Almost 50% of the domestic production is exported. On the other hand imports of floor and wall coverings have also grown over time. The imports have shown a 32% growth, indicating the preference of domestic consumers for high quality and better designed floor and wall coverings being imported mostly from the Middle East and USA.

Exhibit C-137: Export import trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>3918, 3920, 3921, 3925 &amp; 3926</b>	wall /ceiling cover comb with knitted/ woven fabrics, nonwovens/felts of PVC	39181010	Rs. 307 Crore
	other polymers of vinyl chloride	39181090	
	wall /ceiling cover comb with knitted/ woven fabrics, nonwovens/felts of other plastics	39189020	
	floor covering of other plastics nes	39189090	
	plates sheets films foil and strip of poly (vinyl acetate) nes	39209919	
	others plate/ sheets etc. of other plastic n.e.s	39209999	
	other plates, sheets, film foil, strip etc, of polymer of vinyl chloride : other	39219029	
	other builder ware of plastics of poly-urethane	39259010	
	other builders ware of plastics nes	39259090	
	other decorative sheets	39264059	
	other article of plastic nes	39269099	

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HS code family	HS code description	Applicable HS codes	2012-13
<b>5701, 5702 , 5703 &amp; 5705</b>	carpets and other textile floor coverings of wool or fine animal hair, knotted	57011000	
	carpets and floor coverings knotted other than cotton	57019090	
	carpets	57023110	
	carpets, carpeting and rugs	57023210	
	carpets of wool/fine animal hair	57024110	
	other incl. druggets	57024290	
	100% polyamide tufted velour, cut pile/ loop-pile carpet mats with jute, rubber latex or polyurethane foam baking	57032020	
	Other mats and matting	57032090	
	carpets, carpeting and rugs	57033010	
	100% polypropylene carpet mats with jute, rubber, latex Or PU foam baking	57033020	
	other textile floor coverings of other man-made textile material	57033090	
	other textile floor coverings, w/n made up	57050090	
<b>Others</b>	floor coverings and mats	40169100	
	others	42050090	
	wallpaper and similar wall coverings consisting of paper coated/covered on face side with a grained embossed coloured etc/decorated layer or plastic	48142000	
<b>Exports</b>			
<b>3918, 3920, 3921, 3925 &amp; 3926</b>	wall /ceiling cover comb with knitted/ woven fabrics, nonwovens/felts of PVC	39181010	Rs. 552 Crore
	other polymers of vinyl chloride	39181090	
	wall /ceiling cover comb with knitted/ woven fabrics, nonwovens/felts of other plastics	39189020	
	floor covering of other plastics nes	39189090	
	plates sheets films foil and strip of poly (vinyl acetate) nes	39209919	
	others plate/ sheets etc. of other plastic n.e.s	39209999	
	other plates, sheets, film foil, strip	39219029	

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HS code family	HS code description	Applicable HS codes	2012-13
	etc, of polymer of vinyl chloride : other		
	other builder ware of plastics of poly-urethane	39259010	
	other builders ware of plastics nes	39259090	
	other decorative sheets	39264059	
	other article of plastic nes	39269099	
<b>5701, 5702 , 5703 &amp; 5705 Others</b>	carpets and other textile floor coverings of wool or fine animal hair, knotted	57011000	
	carpets and floor coverings knotted other than cotton	57019090	
	carpets	57023110	
	carpets, carpeting and rugs	57023210	
	carpets of wool/fine animal hair	57024110	
	other incl. druggets	57024290	
	100% polyamide tufted velour, cut pile/ loop-pile carpet mats with jute, rubber latex or polyurethane foam baking	57032020	
	Other mats and matting	57032090	
	carpets, carpeting and rugs	57033010	
	100% polypropylene carpet mats with jute, rubber, latex Or PU foam baking	57033020	
	other textile floor coverings of other man-made textile material	57033090	
	other textile floor coverings, w/n made up	57050090	
<b>Others 3918, 3920, 3921, 3925 &amp; 3926</b>	floor coverings and mats	40169100	
	others	42050090	
	wallpaper and similar wall coverings consisting of paper coated/covered on face side with a grained embossed coloured etc/decorated layer or plastic	48142000	

\*source: DGFT, , IMAcS Analysis DGCIS

\*not inclusive of carpet exports.

## 7. Clothtech

The technical components of garments, made out of fabric or yarn, which are there to cater to specific functional needs of the garment are termed as cloth technical textiles or clothtech. These include components like zippers, interlinings, sewing threads, laces, elastics and Velcro among others.

### List of Products

The major products under clothtech have been listed as under:

7. Laces and tapes
8. Interlinings
9. Zip fasteners
10. Elastic Narrow fabric.
11. Hook and Loop fastener
12. labels and badges
13. Umbrella cloth
14. Sewing threads

### Market size and trends

The total estimated market size of Clothtech is around Rs. 8,469 Crore with domestic market valued at Rs. 8,138 Crore constituting 96% of the total market. Domestic production caters to 91% of the market with imports catering to the other 9%.The product wise market size has been shown in the exhibit below.

Exhibit C-138: Market size estimation

Product	2012-13				Market Size
	Production	Import	Export	Domestic Consumption	
Laces and tapes	478	59	10	527	537
Interlining	485	171	9	647	656
Zip fastener	261	3	20	244	264
Elastic narrow tape	713	91	90	714	804
Hook and loop fastener	144	43	1	186	187

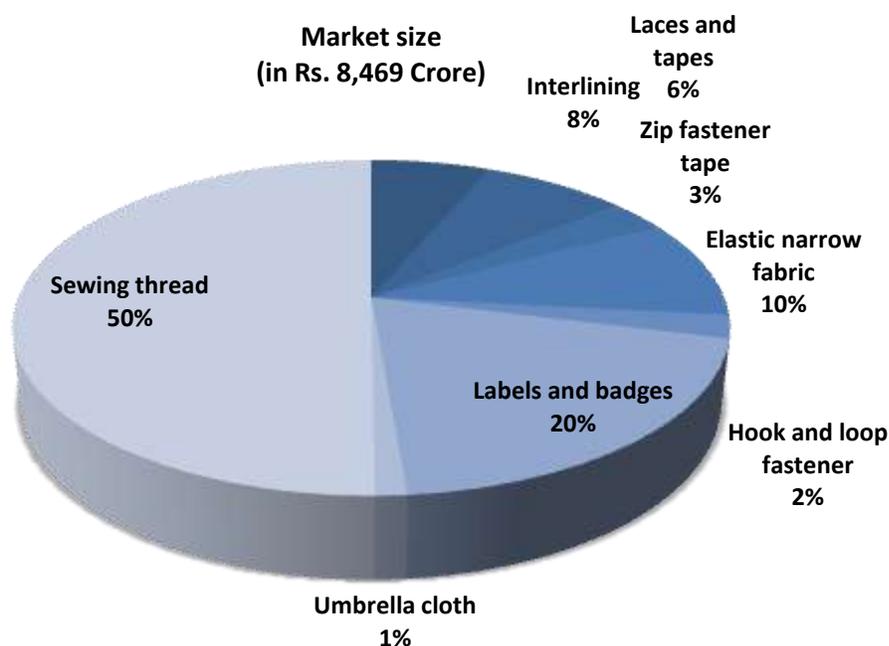
Product	2012-13				Market Size
	Production	Import	Export	Domestic Consumption	
Labels and Badges	1578	94	36	1636	1672
Umbrella cloth	97	6		103	103
Sewing thread	3946	300	165	4081	4246
<b>Total</b>	<b>7702</b>	<b>767</b>	<b>331</b>	<b>8138</b>	<b>8469</b>

\*Source IMAcS analysis

Market size has been calculated as Domestic market + exports

The market is well distributed across segments, with sewing threads and labels and badges having the maximum share of 50% and 20% of entire clothtech segment. Product segment wise market share has been shown in the exhibit below.

Exhibit C-139: Market size pie product wise



Source: IMAcS analysis

### Players & Profitability

The key players of the segment have been listed as under:

- Ruby Mills
- Bombay Dyeing
- Shri Lakshmi Cotsyn

- Y KK India Ltd.
- Sky Industries
- B R Elastic
- Siddharth Filaments
- Premco Global
- Spica Elastica Pvt. Ltd.
- Supreme Non wovens
- K K Non wovens
- Freudenberg Nonwovens India Ltd.
- Coated Sales Company
- Vardhman Mills
- Precot Meridian
- Madura Coats

The detailed analysis of each product has been done in the subsequent sections.

## Laces and tapes

Laces and tapes are small trimmed narrow fabrics used in the clothing sector. These include – shoe laces, tapes and laces used in apparels in particular ladies dresses. Shoe laces are the largest component of it accounting for close to 95% of the demand for laces and tapes.

Shoe lace is a band that pulls the shoe together to hold it to the foot. A shoelace consists of two components: a tape that pulls the shoe tightly together, and an aglet, the hardened taped end that fits through the eyelets on a shoe or boot. Shoe laces are also known as shoestrings or boot laces

Shoe Laces also find application in garments (kids wear), shopping bags, office stationary, home decoration etc. However the consumption in these applications is negligible as compared to that in the footwear industry.

### *Product characteristics*

Shoe laces are primarily made of Polyester, Cotton and Nylon. Polyester shoe laces dominate the market because of higher durability and better anti-slip properties. Cotton shoe laces are waxed to improve their performance and appearance.

Shoe laces are manufactured in variety of colours, shapes and sizes. Shoe laces are available in colours such as white, black, brown, blue, green, red, orange, yellow, etc. as well as colour combinations and patterns based on customer requirements. The product can be flat, round or oval in shape. Round laces are generally used for leather/formal shoes where as flat laces find majority of its application in sport/casual shoes.

Type of lace	Average Width / Diameter
Flat	8-10 mm
Round	3-5 mm

*Source: Industry survey*

Shoe laces are manufactured in standard sizes of 24", 30", 36", 48" etc. as well as custom made as per the required length which depends on the application. The 24" and 30" sizes constitute 80% of the market.

### **Market dynamics and key growth drivers**

Shoe laces are a commodity product. The simple technology level and minimal functionality of the product make it difficult for manufacturers to differentiate their products. Since the product contributes a small share to the total cost of footwear, most footwear manufacturers allow their manufacturing units to source shoe laces locally rather than doing centralised purchase. Thus, cost competitiveness and ability to provide variety of shades are the critical factors for success.

With India being the second largest manufacturer of foot-wears in the world producing 2,065 million pairs in 2012-13, foot-wears are the biggest driver for shoe lace market in India. Export of footwear from India is estimated to be of 115 million pairs.

The Indian footwear retail market is anticipated to surge at a CAGR of 12% during the next three to five years on driven by demand from Mass footwear and economy footwear which are expected to grow at over 30%. With growing preference for casual foot-wears without laces, the demand for covered foot-wears having laces is estimated to be 650 million pairs.

### ***Market size estimate***

Market size of laces and tapes is mainly constituted by the demand for shoe laces. The market for shoe laces is estimated through the demand for closed foot-wears in India. The total domestic market of laces and tapes is estimated to be Rs. 527 Crore with exports market of about Rs. 10 Crore.

Exhibit C-140: Market size estimate

	2012-13
Quantity (in MT)	4513
Value (in Rs. Crore)	537

*\*source: IMAcS analysis, industry sources*

The market has grown considerably over the last five years at 25% per annum driven by the growing demand for shoe laces by the footwear industry which is growing leaps and bounds.

### ***Key growth drivers and Inhibitors***

The market for shoe laces is entirely driven by the footwear industry of India, which is growing at 12% per annum. The demand for shoe laces is expected to grow in line with the closed footwear industry.

The replacement market of shoe laces although is declining with quicker replacement of shoes. The market for shoe laces is expected to grow at 15% per annum during the next three years.

### **Key Manufacturers**

The shoe lace manufacturers are predominantly SSI units and are located in the footwear manufacturing clusters of Agra, Chennai, Vellore, Kanpur, Kolkata etc. Some of the manufacturers of shoe laces are:-

- Neelam shoe lace industry (Delhi),
- Indian Shoe lace (Agra). Indian shoe Lace Company has a capacity of manufacturing 25,000 shoe lace pairs per day.

### **Import export scenario**

The estimated export and import of laces and tapes has grown over the period. While imports have shown a growth of 31% exports have grown by 21% in the last five years.

Exhibit C-141: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5806</b>	other narrow woven fabrics containing by wt 5% or more of elastomeric yarn/rubber thread	58062000	Rs. 59 Crore
	narrow woven fabrics, other than labels & badges; narrow fabrics consisting of warp without weft assembled by means of an adhesive - of cotton - newar cotton	58063120	
	goat hair puttis tape	58063910	
	narrow fabrics consisting of warp without weft assembled by means of an adhesive (bolducs) - of other textile material - others	58063990	
<b>5808</b>	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles - braids, in pieces other than of cotton	58081090	
	Ornamental tapes of cotton	58089010	
	Ribbons of rayon with ornamental edges	58089040	
	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles - OTHERS	58089090	
<b>Exports</b>			

HS code family	HS code description	Applicable HS codes	2012-13
<b>5806</b>	other narrow woven fabrics containing by wt 5% or more of elastomeric yarn/rubber thread	58062000	Rs. 10 Crore
	narrow woven fabrics, other than labels & badges; narrow fabrics consisting of warp without weft assembled by means of an adhesive - of cotton - newar cotton	58063120	
	goat hair puttis tape	58063910	
	narrow fabrics consisting of warp without weft assembled by means of an adhesive (bolducs) - of other textile material - others	58063990	
<b>5808</b>	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles - braids, in pieces other than of cotton	58081090	
	Ornamental tapes of cotton	58089010	
	Ribbons of rayon with ornamental edges	58089040	
	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles - OTHERS	58089090	

\*source: IMAcS analysis, DGCIS

### Machinery details

The machinery used for making of shoe laces include:

- Braining Machine
- Tipping machine
- Waxing machine

### Quality Standards

While there are no quality standards for making of laces and tapes, BIS does specify standard for show laces under IS 6590:1972. However, manufacturers test shoe laces at FDDI.

## Interlinings

Interlining is a fabric used between the inner and outer layer of the garment to improve shape retention, strength or bulk. Different types of interlinings have been discussed as under:

### *Product characteristics*

The interlinings are of two types based on how they are placed in the fabric -

- **Fusible interlining** – The interlining which is fused between the fabric by application of heat and pressure are called as fusible interlinings. It is generally a base fabric with coating of LDPE or HDPE. These are commonly seen in readymade garments due to the following reasons:
  - It can be produced at a consistent quality through a production process
  - It allows better crease retention
- **Non fusible interlining** – this type of interlining is either woven between the fabric or stitched without application of any heat or pressure.

Interlinings can also be classified based on the construct of it as woven and non-woven. Interlining may be woven, knitted or non-woven made out of Cotton, Polyester, Polyester/Cotton or Polyester/Viscose blend. Nonwoven interlining is available in weight ranging from 18 gsm to 70 gsm whereas woven interlining is available in weight ranging from 120 gsm to 250 gsm. Both woven and non woven interlinings are available in fusible as well as non-fusible varieties.

### *Applications*

Interlining finds application in the cuffs, collars and plackets of shirts and in the lapels, fronts, collars and pockets of tailored jackets and blazers, in the waistbands, flies, pockets and belt loops of men's trousers. Another big market for interlining is the ladies brassieres. Invisible from the outside, interlinings ensures accurate fit and optimum wearer comfort and thus, form an important part of the garment. The kind and type of interlining used depends on the costing of the garment. In addition, interlinings can also be found in shoes and furnishings to provide shape, however garment sector is the largest market for interlining.

### **Market size and trade trends**

The demand for interlining is governed by the demand for garments. Readymade and tailor made shirts account for 80% of consumption of interlining, the balance 20% of interlining being consumed in other garments i.e. trousers, jackets, ladies dresses, suits.

The men's readymade shirt market in India was 537<sup>9</sup> million pieces in 2012-13 with the shirting market of another 2007 million metres, which corresponds to roughly 916<sup>2</sup> million pieces. Considering the average requirement of interlining per shirt to be 0.15 sq. metres, the total demand for interlining for shirts is estimated to be 197 million sq. metres. This is expected to account for 80% of total interlining market; hence the domestic interlining market is expected to be 246 million sq. metres valued at Rs. 647 Crore.

### ***Market size estimate***

The market size of interlinings in India for 2012-13 inclusive of exports is estimated to be Rs. 656 Crore equivalent to 250 million sq. m

Exhibit C-142: Market size estimate

	2012-13
Quantity (in million sq. m)	250
Value (in Rs. Crore)	656

*\*source: IMAcS analysis, industry sources*

The market of interlining fabric has grown at 6% per annum during the last five years driven by the increasing use in shirting fabrics. While the consumption of shirts in India has grown by only 3% per annum, usage of more interlining to provide better value addition has led to higher growth of interlining market.

### ***Key growth drivers and Inhibitors***

The major growth drivers for the interlining industry in India in the coming future:

- **Apparel Industry** – Apparel industry in particular the Men's shirt segment accounts for 80% of use of interlining. It is a fast growing segment and is expected to grow at 4% to 5% in the coming years. With usage close to 15 to 20 cm per shirt, the interlining industry is expected to grow in

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<sup>9</sup> It is extrapolated from annual market data for 2010 taken from National Household survey 2011 – Market for textiles and clothing

line with it. In addition, the growing export of RMG and apparels from India which is expected to grow at 8% to 10% would further act as a growth driver.

- **Women's undergarment** – Interlining are also used in making of brassieres for women, which is also a major driver for interlinings. It has a market size of 60 million pieces and is expected to grow at 15% annually. The high growth rate is going to be a major driver for the industry.

#### **Impediments**

- **Price sensitivity in the garment industry** – Indian garment industry is highly price competitive with a majority of readymade garments being sold at lower price points. On an average 65% of the total shirt market is of low price shirts which either do not use interlining or use a cheap interlining. Many of these garments do not use adequate amount and quality of interlining required, thus curbing the market size.

The market for interlinings is expected to grow at 6% per annum during the coming three years.

#### ***Key Manufacturers***

The interlining market in India is organised one with few key players. The major players of woven interlinings in India are:

- Ruby Mills
- Bombay Dyeing
- Shri Lakshmi Cotsyn
- Talreja Textiles and
- Ashima Syntex

In addition to these the major players producing non-woven interlinings are:

- Supreme Non wovens
- Freudenberg Non wovens
- K K Non wovens

#### ***Import export scenario***

The imports of interlining have grown by 19% per annum during the last five years and stood at Rs. 171 Crore. This growth in imports can be attributed to the low cost cheaper imports from China and the slow

*Interim report on Baseline Survey of Technical Textiles in India 2013*

capacity addition into Indian manufacturing during the last five years. While domestic demand for interlining grew at 6%, Indian manufacturing of interlining grew at only 3%.

Export of interlining from India has been stagnant over the last five years growing by a mere 1%. The exhibit below shows different HS codes and the total import export statistics for interlinings.

**Exhibit C-143: Import export trends**

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5407</b>	Other woven fabrics, containing 85% or more by weight of filaments of nylon or other polyamides: dyed: nylon taffeta	54074230	Rs. 171 Crore
	Other woven fabrics, containing 85% or more by weight of filaments of nylon or other polyamides: printed: nylon taffeta	54074430	
	Woven fabrics containing 85% or more by weight of other than non-textured polyester filaments	54076900	
	other woven fabrics, containing less than 85 % by weight of synthetic - others	54078290	
<b>5408</b>	Woven fabrics containing more than 85% or more by weight of artificial filament or strip or the like: dyed woven fabrics of rayon: rayon taffeta	54082215	
	Printed - other woven fabrics, containing 85 % or more by weight of artificial filament or strip or the like --rayon taffeta , printed	54082415	
	Dyed woven fabrics of artificial filament yarn, including woven fabrics obtained from materials of 67 decitex or more - rayon taffeta ,dyed	54083213	
	Printed woven fabrics of artificial filament yarn, including woven fabrics obtained from materials of 67 decitex or more -rayon taffeta	54083415	
<b>5512 &amp; 5513</b>	Other woven fabrics, dyed containing polyester >= 85% by weight	55121910	
	Woven fabrics of other polyester staple fibres - dyed	55132300	
<b>5603</b>	Man-made filaments or non woven weighing <25 g/sqm	56031100	
	man-made filament weighing>25g /sqm	56031200	
	man-made filament weighing between 70g/sqm and 150g/sqm	56031300	
	man-made filament weighing >150g/sqm	56031400	
	nonwovens, whether or not impregnated, coated, covered or laminated weighing not more than 25 g/sqm - 'other filament weighing	56039100	

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HS code family	HS code description	Applicable HS codes	2012-13
	nonwovens, whether or not impregnated, coated, covered or laminated weighing between 25 g/sqm to 70 g/sqm - other filament weighing between 25g/sqm and 70g/sqm	56039200	
	nonwovens, whether or not impregnated, coated, covered or laminated weighing between 70 g/sqm to 150 g/sqm - other filament weighing between 70g/sqm and 150g/sqm	56039300	
	'nonwovens, whether or not impregnated, coated, covered or laminated weighing more than 150g/sqm - other filament weighing >150g/sqm	56039400	
<b>5903</b>	Other fabric impregnated, laminated plated and coated with PVC	59031090	
	cotton fabrics, impregnated, coated etc with other plastics	59039010	
	other fabric plated laminated coated impregnated with other plastics	59039090	
<b>6217</b>	other made up clothing accessories; parts of garments or of clothing accessories - others and trimmings of other textile fibres	62179090	
<b>Exports</b>			
<b>5407</b>	Other woven fabrics, containing 85% or more by weight of filaments of nylon or other polyamides: dyed: nylon taffeta	54074230	
	Other woven fabrics, containing 85% or more by weight of filaments of nylon or other polyamides: printed: nylon taffeta	54074430	
	Woven fabrics containing 85% or more by weight of other than non-textured polyester filaments	54076900	
	other woven fabrics, containing less than 85 % by weight of synthetic - others	54078290	
<b>5408</b>	Woven fabrics containing more than 85% or more by weight of artificial filament or strip or the like: dyed woven fabrics of rayon: rayon taffeta	54082215	Rs. 9 Crore
	Printed - other woven fabrics, containing 85 % or more by weight of artificial filament or strip or the like --rayon taffeta , printed	54082415	
	Dyed woven fabrics of artificial filament yarn, including woven fabrics obtained from materials of 67 decitex or more - rayon taffeta ,dyed	54083213	
	Printed woven fabrics of artificial filament yarn, including woven fabrics obtained from materials of 67 decitex or more -rayon taffeta	54083415	
<b>5512 &amp; 5513</b>	Other woven fabrics, dyed containing polyester >= 85% by weight	55121910	

HS code family	HS code description	Applicable HS codes	2012-13
	Woven fabrics of other polyester staple fibres - dyed	55132300	
<b>5603</b>	Man-made filaments or non woven weighing <25 g/sqm	56031100	
	man-made filament weighing >25g /sqm	56031200	
	man-made filament weighing between 70g/sqm and 150g/sqm	56031300	
	man-made filament weighing >150g/sqm	56031400	
	nonwovens, whether or not impregnated, coated, covered or laminated weighing not more than 25 g/sqm - 'other filament weighing	56039100	
	nonwovens, whether or not impregnated, coated, covered or laminated weighing between 25 g/sqm to 70 g/sqm - other filament weighing between 25g/sqm and 70g/sqm	56039200	
	nonwovens, whether or not impregnated, coated, covered or laminated weighing between 70 g/sqm to 150 g/sqm - other filament weighing between 70g/sqm and 150g/sqm	56039300	
	'nonwovens, whether or not impregnated, coated, covered or laminated weighing more than 150g/sqm - other filament weighing >150g/sqm	56039400	
<b>5903</b>	Other fabric impregnated, laminated plated and coated with PVC	59031090	
	cotton fabrics, impregnated, coated etc with other plastics	59039010	
	other fabric plated laminated coated impregnated with other plastics	59039090	
<b>6217</b>	other made up clothing accessories; parts of garments or of clothing accessories - others and trimmings of other textile fibres	62179090	

\*source: IMAcS analysis, DGCIIS

### Machinery details

Key machinery for making of non-woven interlinings are supplied by:

- A.T.E. Pvt. Ltd
- Dhall Enterprise and Engineers Ltd.
- Hi- tech Engineers

### Quality Standards

There are no set quality parameters for interlinings

## Zip fasteners

Zip fasteners are a fastening device temporarily joining the two edges of fabric. The idea of a fabric fastener was first introduced in 1893 by Whitcomb L Judson, who suggested them as shoe fasteners. However the first type of zip fasteners was introduced only in 1914, when Gideon Sundback came out with the first version of modern zip which he called as the hook-less hooker. It got its name as the zipper in 1922.

### *Product characteristics*

The zipper has following main components:

- The slider – it slides over the teeth stringer and acts as fastener.
- The teeth stringers – these are attached to the zip fastening tape and act as the element which is fastened by the slider.
- The zip fastening tape - It is the technical textile part of the zipper. It is a narrow strip of about 12 mm to 15 mm attaching the zipper to the fabric.

The zip fastener tape is generally made of polyester or cotton mixed with polyester due to its longer life and higher strength. The raw material mostly polyester, is easily available in India with Reliance catering to a major chunk of it. Due to high domestic production, there is negligible import of polyester for zipper making. The zip fastener tape can constitute anything between 1% to 10% of the zipper's value depending on the type of slider and puller used. On an average it is higher for polyester zippers and lower for metallic zippers.

### *Applications*

The usage norm for zip fastener tapes for different types of zippers is:

Exhibit C-144: Product characteristics

S. No.	Type of zipper	Average width of fastener tape	Average length of fastener tape
1.	Open ended zippers	15 mm	20 to 22 mm
2.	Close ended zipper	12 mm to 15 mm	7 mm

The major application areas of zippers have been enlisted as under:

**Exhibit C-145: Major application of Zippers**

S. No.	Type of zipper	Applications
1.	L type coil	Trousers, Skirts
2.	Spiral coil	Trousers, Skirts, Jackets, Shoes, Luggage, bags
3.	Invisible zippers	Ladies dresses, Leather shoes, skirts
4.	Plastic zippers	Track suits, T shirts, Men's shirts, Jackets
5.	Metallic zippers	Denim , Cotton trousers, Jackets, Industrial wears, Tents, Shoes

### **Market size and trade trends**

The market size of zip fastening tape is completely dependent and directly proportional to the usage of zippers. Apparel and home textiles account for 70% of the zip usage. In apparels, trousers, jeans, cushion covers and ladies frocks account for close to 80% of the use of zippers in textiles. In addition to this the usage of zippers is also prominent in soft luggage industry, leather goods like boots and purses. The market size for zip fastening tape has been estimated based on the current market for apparels.

### ***Market size estimate***

Based on the consumption of different apparels and home textiles in India as per National Household survey for Market of textiles and clothing, and the consumption norms as per industry discussions, the domestic market for zip fastening tape is estimated to be Rs. 244 Crore equivalent to 1050 million metres.

**Exhibit C-146: Market size estimate**

	2012-13
<b>Quantity (in Million metres)</b>	1050
<b>Value (in Rs. Crore)</b>	244

*\*source: IMaCS analysis, industry sources*

The market of zip fastening tape has grown at 13% per annum during the last five years driven by the growing market for jeans and trousers. While other apparels have grown in single digits, the trouser market of India has grown by a phenomenal 22% during the last five years, driving the demand for zip fastening tapes. While the market for apparels is a matured market and is expected to grow by about 5% to 10% annually, the increasing demand in soft luggage, growing preference for leather boots and purses would help the market grow in the coming years.

### ***Key growth drivers and Inhibitors***

The major growth drivers for the zipper tape industry in India is the apparel industry

- **Apparel Industry** – Apparel industry which accounts for 80% of use of zippers and is expected to grow at 4% to 5% in the coming years. With usage close to 7 inches per garment, the Zipper fastening tape industry is expected to grow in line with it. In addition, the growing export of RMG and apparels from India which is expected to grow at 8% to 10% would further act as a growth driver. It also provides the seasonal nature to the zipper fastening tape industry with higher demands prior to the sale seasons
- **Leather goods industry – Jackets, Purses & Boots** - This is the fastest growing segment for zipper industry. With the increasing fashion appeal, this segment is bound to grow in double digits, and accounts for close to 10% of zip fastening tape usage.
- **Luggage and bags industry** – The second major driver is the luggage industry of India. Although most of the zippers used here are un-organised this might not be using a zip fastening tape and fabric but any other cheap fabric to bring down the cost. However, if this segment can be targeted for use of technical textile tape, it can be a goods future growth prospect.

### **Impediments**

- **Use of normal fabric as fastening tape in un-organised industry** – In the un-organised zipper industry of India, which accounts for close to 80% of zipper production, cost is a major factor. Hence to compete, many players use the normal fabric instead of the technical textile zip fastening fabric in zippers. With little awareness about the zip fastening fabric and very small share of the fabric in over all zipper, most such replacement go un-questioned.

The market for zip fasteners in India is expected to grow at 7% driven by the increasing requirement in apparel and soft luggage category.

### ***Key Manufacturers***

There are only a few major players in the zipper industry of India with close to 80% of the domestic zipper market being catered by the un-organised players as per industry estimates. In the organised segment YKK India Pvt. Ltd. Is the largest player catering to close to 70% of the total organised market. Other major players being Madura Coats, Optics Zippers, Ideal Zippers and Tex Corp Pvt. Ltd. These organised players mainly play in the Ready to wear garment section and Jackets section of the apparel industry and with exports from India, 90% of which is from organised sector. On the other hand, the vast

luggage, bags, furnishing and ready to stitch segment is catered mainly by the un-organised small players.

### ***Import export scenario***

The imports of zippers and zipper tapes have reduced in India over the last five years declining at 22%. The major credit goes to the increasing domestic production by players like YKK India Ltd. YKK India Ltd is also a major exporter of zippers from India. The total export of zipper tape is estimated to be around Rs. 20 Crore for 2012-13.

**Exhibit C-147: Import export trends**

HS code family		Applicable codes	HS	2012-13
<b>Imports</b>				
<b>9607</b>	Others	96071190		Rs. 3 Crore*
	Zip fasteners	96071910		
	Slide fasteners made of others - others	96071990		
	Parts of slide fasteners	96072000		
<b>Exports</b>				
<b>9607</b>	Others	96071190		Rs. 20 Crore*
	Zip fasteners	96071910		
	Slide fasteners made of others - others	96071990		
	Parts of slide fasteners	96072000		

source: IMAcS analysis, DGCIIS

\*Above figures have been arrived at by calculating zipper export and imports and taking at 15% share of the value as the value of zipper tape as per industry norm.

### **Quality Standards**

The main quality standards applicable for the zip fasteners in India are: IS 8894/3184/4829. Other international standards are JIS-S3015 and ASTM D2061-1998

## Elastic Narrow Fabrics

Elastic narrow fabrics are used as an input to the garments to provide elasticity to the fabric wherever required. It is an important input to the undergarment industry and are commonly used in other garments i.e. shorts, jackets and skirts, moulded luggage, baby diapers, sports goods, medical goods, etc.

### *Product characteristics*

Elastic narrow fabrics are made from an elastomeric yarn and yarns made from cotton, polyester and nylon. More than 3000 different varieties of elastic fabrics are manufactured however, based on manufacturing technology they can be classified as woven and knitted. The fabric is expected to have the following properties

- Stretch-ability
- Shrink resistance
- Durability to regular wash
- Soft feel

Knitted elastic tapes are generally available in widths 8 mm, 12 mm, 20 mm and 25 mm. Woven elastic tapes range in widths 25 mm, 32 mm and 38 mm. These elastic tapes are primarily used for undergarments. The narrow fabric is made with or without logo along the length depending on customer's requirement.

### *Key application areas of elastic narrow fabrics*

Elastic narrow fabric find usage in the vast hosiery market of India, particularly in the under wears produced. In addition, elastic narrow fabrics are also used in garmenting industry in particular, children and women wear and in baby diapers.

### Market size and trade trends

The market size of elastic narrow fabric is dependent on the hosiery industry in particular the undergarments section which accounts for close to 85% of the elastic narrow fabric market. In addition it is also used in the children and women wear. The average requirement of elastic narrow fabric in under wears is about 90 cm for women undergarments and about 2.5 m for men's undergarment. The total market for undergarments for men and women is estimated to be 1065 million pieces in 2012-13 as derived from the National Household survey on textile and clothing.

### **Market size estimate**

The domestic market size of elastic narrow fabrics in India for 2012-13 is estimated to be of 1,751 million metres worth Rs. 714 Crore. Taking into account the export market of Rs. 90 Crore, the total market potential for 2012-13 is Rs. 804 Crore. The table below gives the market size estimates of elastic narrow fabric for 2012-13.

Exhibit C-148: Market size estimate

	2012-13
Quantity (in Million metres)	2,263
Value (in Rs. Crore)	804

*\*source: IMAcS analysis, industry sources*

The market of elastic narrow fabric has grown by 12% during the last five years. The major part of this growth can be attributed to the domestic market which has grown by 18%, while the export market has been declining at 13% y-o-y. Domestic market has also seen volume growth of 21% indicating the growing demand of elastic fabric in Indian manufacturing sector.

### **Key growth drivers and Inhibitors**

The major growth drivers for the elastic narrow fabric industry are:

- **Undergarment Industry** – It is the largest driver of interlining market accounting for nearly 85% of total consumption. In the undergarment industry the men’s undergarment make up for 70% of the market growing at a good rate of 11%, while the women’s undergarment is the rest 30% growing at a goods rate of 11%. Hence the undergarment industry is expected to grow at around 5% and would be the primary driver for elastic narrow fabrics.
- **Children’s clothing – Baba suits** – The children clothing is another major sector using elastic narrow fabrics. It stood at 303 million pieces in 2010 and is expected to grow at a slow rate of 3%.

The market of interlining is expected to grow at 10% during the next three years.

### **Key Manufacturers**

The manufacturing capacity for elastic narrow fabric in India is highly fragmented, with only a very few large players. Spica Elastic Private Limited is the largest manufacturer of narrow elastic fabrics in India with installed capacity of 18 million metres of narrow fabrics per month. The company has vertically integrated production facilities and manufactures broad range of products including men’s jacquard

elastics for briefs and boxers, men’s plain elastics for briefs and boxers, bra strap elastics and ladies panty elastics in 100% Cotton, Nylon and Polyester. In addition to Spica other key players in the organised sector, these are:

- Sky Industries
- B R Elastic
- Siddharth Filaments
- Premco Global
- Tulip Elastic
- Agarwal elastic
- MP tapes
- JV tapes
- Clifton tapes
- Kumar Elastics
- Kohinoor elastics
- Balaji tapes

The above mentioned players account for 45% to 50% of elastic narrow fabric production in India.

### ***Import export scenario***

The imports of elastic narrow fabric has grown to Rs. 91 Crore in 2012-13 from Rs. 65 Crore in 2011-12. The rise in import was due to lower production by the industry leaders – Spica Industries. However, from 2007-08 to 2011-12, the imports have remained stagnant indicating that, the entire growth in market was catered by domestic players. During the last five years, the manufacturing of elastic narrow fabrics has also gone up by 12% y-o-y.

The market for exports has seen a decline of 13% during the last five years and is currently pegged at Rs. 90 Crore as compared to Rs. 155 Crore in 2007-08. The table below gives details of import and export HS codes used for international trade.

**Exhibit C-149: Import export trends**

HS code family	HS code description	Applicable codes	HS	2012-13
<b>Imports</b>				
<b>5806 &amp; 5808</b>	narrow woven pile fabrics (includes terry		58061000	Rs. 91 Crore

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HS code family	HS code description	Applicable codes	HS	2012-13
	twilling & similar terry fabrics)and chenille fabrics			
	looped pile fabrics of man-made fibres	60012200		
	knitted or crocheted fabrics containing elastomeric yarn>=5% by wt but not rubber thread	60024000		
	knitted or crocheted fabrics of a width not exceeding 30 cm, containing by weight 5 % or more of elastomeric yarn or rubber thread - other knitted or crocheted fabrics of width less than 30 cm	60029000		
<b>6001 , 6002 &amp; 6005</b>	warp knitted fabrics of wool or fine animal hair	60059000		
	other narrow woven fabrics containing by wt 5% or more of elastomeric yarn/rubber thread	58062000		
	narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials excluding labels and badges - others	58063990		
	braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles of other materials - others	58089090		
<b>Exports</b>				
<b>5806 &amp; 5808</b>	narrow woven pile fabrics (includes terry twilling & similar terry fabrics)and chenille fabrics	58061000		Rs. 90 Crore
	looped pile fabrics of man-made fibres	60012200		
	knitted or crocheted fabrics containing elastomeric yarn>=5% by wt but not rubber thread	60024000		
	knitted or crocheted fabrics of a width not exceeding 30 cm, containing by weight 5 % or more of elastomeric yarn or rubber thread - other knitted or crocheted fabrics of width less than 30 cm	60029000		
<b>6001 , 6002 &amp; 6005</b>	warp knitted fabrics of wool or fine animal hair	60059000		
	other narrow woven fabrics containing by wt 5% or more of elastomeric yarn/rubber thread	58062000		
	narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials excluding labels and	58063990		

HS code family	HS code description	Applicable HS codes	2012-13
	badges - others		
	braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles of other materials - others	58089090	

\*source: IMAcS analysis, DGCI

### Machinery details

The key machinery suppliers in India are:

Company	Machines supplied
Trikso India Machineries, Ahmedabad	High Speed Needle Looms Festooning machine Warping Machine Elastic finishing machine Measuring & spool winding machine
Susmatex Machinery Ltd., Ahmedabad	Electric Jacquard For Narrow Fabric Loom Needle Loom Warping Machine

Other key suppliers of machinery are:

- A.T.E Pvt. Ltd.
- Biance Textile Solutions (I) Pvt. Ltd.
- Laxmi Automatic Loom Works
- Himson Textile Engineering Industries Pvt. Ltd.

### Quality Standards

In absence of any set parameter the manufacturer of the elastic narrow fabric usually follows the breaking strength and elongation specifications given by the customer.

## Hook and Loop fasteners

Velcro is a brand name of the fabric hook-and-loop fasteners however today it is used as a generic term for the product hook & loop tape fasteners. Hook and loop (H&L) fasteners consist of a combination of two separate woven tapes, one called as hook tape and the other as loop tape. The tapes display excellent fastening properties when placed in contact with each other and thus offer hundreds of potential closure systems (fastening applications) for a wide range of applications.

### *Product Characteristics*

H&L fasteners are generally made of Nylon and Polyester. The product is available in width ranging from 12 mm to 125 mm and length of 25 meters though it can be produced in any length depending upon the customer's requirement. The H&L fastener of 1 meter length and 25 mm of width, weighs 7.5 grams.

### Applications and consumption norms

H&L fasteners are easy to use, safe and maintenance free. The effectiveness of the fastener is maintained even after repeated fastening and unfastening. Thus, the product has achieved good penetration in various application areas. H&L fasteners find application in industries such as:

- Leather garments/furnishings
- Surgical and orthopaedic apparatus
- Shoes and footwear manufacturing
- Luggage/bag manufacturers
- Toys
- Plastic goods
- Automobile upholstery and various other industry segments.

The consumption norm and requirement of hook and loop fastener in different applications has been shown in the exhibit below:

**Exhibit C-150: Consumption norms for H & L fasteners**

Application	Consumption norm for H & L fastener
Shoes	5 to 15 cm
Defense clothing	50 to 75 cm
Automobile	50 to 100 cm
Saddlery	75 to 100 cm
Netting	Equivalent to the perimeter of the net
Bags	Varies from 5 to 50 depending on the product
Cushion cover	5 to 25 cm

Application	Consumption norm for H & L fastener
Sleeping bag	50 cm to 2 meters
Robe	5 to 10 cm

\*source: industry insights, secondary research

In addition to the above mentioned common applications hook and loop fastener was used to hold together a human heart during the first artificial heart surgery. It is also used in nuclear power plants and army tanks to hold flashlights to walls. Cars use it to bond headliners, floor mats and speaker covers. It is used in the home when pleating draperies, holding carpets in place and attaching upholstery, among many other things. It closes backpacks, briefcases and Trapper Keepers, secures pockets and holds disposable diapers on babies. It is used in surfboard leashes and orthopaedic braces. H&L fasteners made of Teflon loops, polyester hooks, and glass backing is used on space shuttles.

### Market size and trade trends

H&L fasteners are used as fastening system in a variety of areas. Footwear industry is the major consumer of H&L fastener accounting for around 20-25% of the total consumption. In the footwear industry especially these fasteners are used in the kids and speciality sports category. Defence segment consumes H&L fasteners in clothing and other accessories and is the second largest application area with around 7-10% usage. Other important segments which consume around 10% of H&L fasteners are nettings, automobile and saddlery segment. Other applications include orthopaedic goods, sports goods, leather goods, abrasives, stationary, luggage etc. The price of H&L fasteners is indirectly related to the oil prices as the raw material (nylon/polyester) is a petroleum product. However the price variations are not proportionate and are experienced after a long time lag.

### *Market size estimate*

The market for hook and loop fasteners has been estimated using the manufacturing of the major suppliers – Sky Industries and Siddhartha filaments who together account for close to 75% of organised market. The market size of hook and loop fasteners in India for 2012-13 inclusive of exports is estimated to be of 528 million metres valued at Rs. 187 Crore.

Exhibit C-151: Market size estimate

	2012-13
Quantity (in Million metres)	528
Value (in Rs. Crore)	187

\*source: IMaCS analysis, industry sources

The total market of interlining fabric has grown at 27% y-o-y during the last five years. While exports have been marginal, domestic market grew at 35% y-o-y.

### **Key growth drivers and Inhibitors**

Key growth driver for hook and loop fasteners has been the growing demand for Velcro based foot-wears and the soft luggage industry. The foot wear market is growing at 12% per annum which is expected to drive the growth in coming years. In addition to that, the soft luggage industry would be a major driver for the hook and loop fastener in the near future. Currently, soft luggage industry is estimated to be valued at Rs. 2600 Crore and is expected to grow at 16.5% per annum. The overall growth of hook and loop fasteners is estimated to be around 12% y-o-y during the next three years.

### **Key Manufacturers**

The manufacturing of hook and loop in India is mostly done by a few large players in the organised sector. Sky industries Pvt. Ltd. is the largest manufacturer of hook and loop fasteners in India commanding more than 50% share of total production. It has a production capacity of 103 million metres. Other key players are:

- Siddhartha Filaments Pvt. Ltd.
- Magic fasteners Pvt. Ltd.

### **Import export scenario**

The import of hook and loop a fastener has grown at 30% y-o-y from 2007-08 to 2011-12 and was Rs. 20 Crore in 2011-12. However, due to lower production of Sky Industries, the leading H&L manufacturer in 2012-13, the import demand in 2012-13 grew to Rs. 43 Crore almost double of what it was in 2011-12. Growing exports indicate growing acceptability of Indian hook and loop in international markets. On the other hand the import demand for H&L fasteners has gradually gone down to Rs. 1 Crore from Rs. 5.5 Crore in 2007-08, indicating the increasing competitiveness of Indian manufacturing.

Exhibit C-152: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5806 &amp; 5808</b>	Narrow woven pile fabrics(including terry twilling & similar terry fabrics)and chenille fabrics	58061000	Rs. 43 Crore
	Narrow fabrics consisting of warp without	58063190	

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HS code family	HS code description	Applicable HS codes	2012-13
	weft assembled by means of an adhesive of other textile materials of cotton - others - narrow fabrics etc, other		
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other man made textile materials - others	58063200	
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials excluding labels and badges - others	58063990	
	-	58069190	
	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles of other materials - OTHERS	58089090	
<b>5906 &amp; 5911</b>	Rubberised textile fabrics of other materials except rubberised knitted/crocheted goods	59069990	
	Textile products and articles suitable for industrial use - for technical uses - others	59119090	
<b>Others</b>	Other articles of plastics and articles of other materials	39269099	
<b>Exports</b>			
<b>5806 &amp; 5808</b>	Narrow woven pile fabrics(including terry twilling & similar terry fabrics)and chenille fabrics	58061000	Rs. 1 Crore
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials of cotton - others - narrow fabrics etc, other	58063190	
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other man made textile materials - others	58063200	
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials excluding labels and badges - others	58063990	
	-	58069190	
	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles of other materials - OTHERS	58089090	
<b>5906 &amp; 5911</b>	Rubberised textile fabrics of other materials except rubberised knitted/crocheted goods	59069990	
	Textile products and articles suitable for industrial use - for technical uses - others	59119090	

HS code family	HS code description	Applicable HS codes	2012-13
Others	Other articles of plastics and articles of other materials	39269099	

*\*source: IMAcS analysis, DGCI*

### Machinery details

The Hi speed needle looms used for making H&L fasteners are mainly supplied by KY Taiwan and Mueller

### Quality Standards

The main quality standards applicable to hook and loop fasteners are:

- IS-8156-1994
- Oeko-Tex Standard 100 (Product Class II)

## Labels

Label is a piece of material attached to an object to show its contents, ownership, use or destination. Labels are used in garments, home furnishing, stuffed toys, soft luggage, shoes etc. Though manufacturers use different type of labels to create a distinct identity,

Labels in general can be classified into the following varieties:

Exhibit C-153: Classification of labels

Type of label	Purpose	Typical Size
Size label	Shows the size of garment i.e. small (S), medium (M), large (L), extra large (XL) etc.	12mm x 25mm
Pocket label	Label stitched on to the pocket	Width ranging from 15mm to 30mm
Main label	Contains information like Brand name and Logo	Width ranging from 16mm to 50 mm ; may go up to 100 mm
Wash care label	Contains the washing instructions for the garment.	Width ranging from 25mm to 40mm

### *Product characteristics*

There are two primary categories of labels – Printed and Woven. Printed labels are often printed on materials such as satin, acetate, polyester, nylon and cotton twill. These labels are available in a variety of sizes, colours, and printing options. Printed labels though inexpensive, are unable to withstand the standard wear. These labels fade either through washing or as a result of skin oils reacting with the print which reduces the branding aspect of the label. Woven Labels also available in a variety of finishes and fabric choices i.e. damask, semi-damask, satin, and taffeta. Woven labels have better durability to regular wearing and cleanings. Amongst the variety of woven labels damask and damask mixed fabrics are the most reliable and comfortable labels. Damask is a tighter weave fabric that remains soft even with finished edges and provides the best finish with a smoothness that reflects style and comfort and thus, is the most preferred amongst quality conscious customers. Semi-damask has many qualities of damask at a slightly lower price point and hence, is a mid line choice when it comes to labels. Satin is the most popular choice but the fabric is thin and can snag easily. Taffeta is stiffer than satin and can stand

up to a bit more snagging. However, with both satin and taffeta the finished edges of the labels can be stiff, leading to a prickly feeling.

Clothing labels come in a variety of styles. The product is available in the following formats:

- Continuous tape in Roll Form
- Cut Seal
- Cut Fold in End fold, Centrefold and Mitre fold
- Filled / Stuffed labels
- Die-cut / Laser cut labels
- Ready-to-stick labels (backside double adhesive tape)

### ***Application***

Labels have major application in garments where the labels are expected to have smooth feel and durability to regular wear and washing as well as they should not snag

### **Market size and trade trends**

Apparels including hosiery garments and home furnishing sectors account for 80 – 85% of the consumption of labels. The number of labels per garment/home furnishing varies from one to four. Considering the label requirement of various product categories i.e. shirts, trousers, uniforms, inner wear, children wear, skirts, t-shirts, bed sheet, towel etc. the average consumption of label per product is computed as 2 labels/garment and 1 label per home furnishing product. The average price per label is around 80 paisa.

**Exhibit C-154: Consumption norm for labels**

<b>Particulars</b>	
<b>Average label per garment</b>	2
<b>Average label per home furnishing product</b>	2
<b>Average price of a label</b>	Rs 0.81

In addition, labels are also used for shoes, soft toys, luggage, etc. The usage of labels in these applications is around 20% of the total usage.

### **Market size estimate**

The market size of labels has been calculated by estimating the demand from the garmenting sector for different types of labels. The estimated total market including exports for 2012-13 is 20.6 billion pieces valued at Rs. 1,672 Crore with domestic market of Rs. 1,636 crore.

Exhibit C-155: Market size estimate

	2012-13
Quantity (in Billion pieces)	20.6
Value (in Rs. Crore)	1,672

\*source: IMAcS analysis, industry sources

The total market of interlining fabric has grown at 6% y-o-y during the last five years. The market has grown uniformly with both domestic as well as exports growing stably at 6% and 7% respectively. However, the growth in domestic market is more because of inflation with the volume of sales growing by just 2% on a y-o-y basis.

### **Key growth drivers and Inhibitors**

Key growth drivers for label industry are the growing garmenting industry and apparel exports from India. With the growing organised retail, the demand for labels would increase, as the usage of label per garment would increase. The demand for label is directly pegged with the apparel industry of India. With the growing share of organised retail the demand of label per clothing is increasing, this along with the growth of apparel sector is expected to drive the industry at 8% per annum during the next three years.

### **Key Manufacturers**

Indian Woven-labels industry is concentrated in the several key cities like Bangalore, Delhi, Tirupur, Mumbai, Ahmedabad, Kolkata and other cities of North and North-east.

Key manufacturers of labels are:

- K K Non wovens
- Premco Global
- Arex Industries
- Uniroyal India
- Unique Tags

**Import export scenario**

The import of labels has remained stagnant over the last five years growing at just 2% y-o-y. Exports on the other hand, have slow but stable growth growing at 8% y-o-y reaching a total of Rs. 36 Crore.

Exhibit C-156: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5801 &amp; 5806</b>	Woven pile fabrics and chenille fabrics of cotton, other than fabrics of terry and narrow elastic -'OTHERS	58012290	Rs. 94 Crore
	Narrow woven pile fabrics (including terry twilling & similar terry fabrics)and chenille fabrics	58061000	
	Narrow fabrics etc, other	58063190	
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials excluding labels and badges	58063990	
<b>5807, 5808 &amp; 5809</b>	Woven labels badges & the like of cotton	58071010	
	Label badges etc of man-made fibre woven	58071020	
	Woven labels badges etc of other textile materials	58071090	
	Other labels badges & similar articles of felt or non-woven	58079010	
	Other labels badges & similar articles	58079090	
	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles - others	58089090	
	Woven fabrics of metal thread and woven fabrics of metallised yarn of heading, of a kind used in apparel, as furnishing fabrics or for similar purposes, not elsewhere specified or included	58090090	
<b>Others</b>	Other made up clothing accessories; parts of garments	62179090	

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HS code family	HS code description	Applicable HS codes	2012-13
	or of clothing accessories - others and trimmings of other textile fibres	95029100	
	Garments and accessories thereof, foot-wear and headgear for dolls representing humans - as per 2007 HS code	96062990	
	Buttons, press-fasteners, snap-fasteners and press-studs, button moulds and other parts of these articles; button blanks - others		
<b>Exports</b>			
<b>5801 &amp; 5806</b>	Woven pile fabrics and chenille fabrics of cotton, other than fabrics of terry and narrow elastic	58012290	
	Narrow woven pile fabrics(including terry twilling & similar terry fabrics)and chenille fabrics	58061000	
	Narrow fabrics etc, other	58063190	
	Narrow fabrics consisting of warp without weft assembled by means of an adhesive of other textile materials excluding labels and badges - OTHERS	58063990	
<b>5807, 5808 &amp; 5809</b>	Woven labels badges & the like of cotton	58071010	Rs. 36 Crore
	Label badges etc of man-made fibre woven	58071020	
	Woven labels badges etc of other textile materials	58071090	
	Other labels badges & similar articles of felt or non-woven	58079010	
	Other labels badges & similar articles	58079090	
	Braids in the piece; ornamental trimmings in the piece, without embroidery, other than knitted or crocheted; tassels, pompons and similar articles - others	58089090	

HS code family	HS code description	Applicable HS codes	2012-13
	Woven fabrics of metal thread and woven fabrics of metallised yarn of heading, of a kind used in apparel, as furnishing fabrics or for similar purposes, not elsewhere specified or included	58090090	
<b>Others</b>	Other made up clothing accessories; parts of garments or of clothing accessories - others and trimmings of other textile fibres	62179090	
		95029100	
	Garments and accessories thereof, foot-wear and headgear for dolls representing humans - as per 2007 HS code	96062990	
	Buttons, press-fasteners, snap-fasteners and press-studs, button moulds and other parts of these articles; button blanks - others		

\*source: IMAcS analysis, DGCIIS

### Machinery details

The machines used for manufacturing Woven labels are:

- Flexible Rapiar Weaving Machines equipped with electronic jacquard
- Needle Looms
- Warping machines
- MuCAD designing systems.
- Ultrasonic slitting machine.
- Cut fold machines
- Laser cutting machine
- Label finishing machine
- Label stuffing devices

The main suppliers of these machines are

- Jakob-Mueller (Switzerland)
- Kong River (Hong Kong)
- Willy (Italy)
- Viable (USA)
- AG Frick

Printed labels are made using the screen printing or offset printing technology. Machines used for Printed labels are:

- Flexo Fabric Printing Machines
- Letter Press Machines
- Sonic Cutting Machines
- Cold Cut Machines
- Hot Cut Machines

### **Quality Standards**

There are no set quality parameters for labels. However, the quality of labels depends on specific buyer requirements since different buyers have their own standards related to product, environment, social etc. However, wash fastness test and dimensional stability test are usually carried out for all labels. Another commonly followed standard is Oeko-Tex Standard 100.

## Umbrella Cloth

Umbrella fabric is a medium weight, plain weave taffeta fabric used for manufacturing Umbrellas. Umbrellas are used primarily in rainy seasons. They are also used for protection against Sun however such usage is majorly in regions which encounter extreme sunshine especially the regions close to the equator. Earlier umbrellas were manufactured using cotton fabric coated with waterproofing agent. With advent and extensive usage of synthetic material the umbrella fabric used these days is polyester and nylon taffeta fabric.

### *Product characteristics*

Umbrella fabric is made of polyester filament yarn or nylon filament yarn in varying constructions i.e. 150T, 160T and 190T where T indicates the thread density. The umbrella fabric is expected to be water-proof for the rainy season, should maintain physical form during extreme ultraviolet exposure in the summer season, and should have high tear resistance and high abrasion resistance. The GSM of umbrella fabric typically ranges from 110 to 280 based on type of umbrella.

### Market size and trade trends

The demand for umbrellas depends upon climatic conditions, population, usage of umbrella for advertisement and social outlook. The umbrella market generally grows slowly due to reuse of old umbrellas. The market is growing on account of growing fashion in use of umbrellas, where in people prefer to have printed fashionable umbrellas, which are now also common with kids. Umbrellas for kids with fancy and contemporary designs are also a growing market. As per survey of NSSO for 2010-11, the market for umbrella and rain coats is growing at 18%.

### *Market size estimate*

The market of umbrella fabric has been estimated using the consumption statistics of umbrella in India across Urban and Rural areas based on the reports of NSSO. The estimated market size for umbrella fabrics is Rs. 109 Crore for 2012-13 in India with a domestic market of Rs. 103 Crore. The market has grown at 8% y-o -y over the last five years.

Exhibit C-157: Market size estimate

	2012-13
Quantity (in million sq. metres)	12.2
Value (in Rs. Crore)	109

\*source: IMaCS analysis, industry sources

### **Key growth drivers and Inhibitors**

While the demand for umbrella is being replaced by rain coats and wind cheaters in the urban areas, the use of fashionable printed umbrellas is expected to drive the demand further. In the rural areas with higher penetration and preference for umbrellas, the market is expected to grow in line with the growing households in the key areas facing heavy rainfall. The market for umbrella is expected to grow at 8% per annum during the coming three years

### **Key Manufacturers**

The manufacturing of umbrella fabrics is done by SME and MSME industries with very limited large scale players. Key manufacturers of umbrella fabric in India are:

- Coated Sales Company
- Citizen Umbrella Manufacturers
- PNP polytex Pvt. Ltd.
- Dropadi Fabrics
- BT silk mills
- Metal fab polycoats Ltd.

### **Import export scenario**

India is an importer of Umbrella fabrics. Due to large domestic manufacturing the import of umbrella fabric is just around Rs. 3 Crore.

Exhibit C-158: Import export trends

HS code family	HS code description	Applicable codes	HS	2012-13
<b>Imports</b>				
<b>5407</b>	Unbleached umbrella cloth panel fabrics	54071014		Rs. 6 Crore
	Bleached umbrella cloth panel fabrics	54071024		
	Dyed umbrella cloth panel fabrics	54071034		
	Printed umbrella cloth panel fabrics	54071044		
	Other umbrella cloth panel fabrics	54071094		
<b>Exports</b>				
<b>5407</b>	Unbleached umbrella cloth panel fabrics	54071014		-
	Bleached umbrella cloth panel fabrics	54071024		
	Dyed umbrella cloth panel fabrics	54071034		

HS code family	HS code description	Applicable HS codes	2012-13
	Printed umbrella cloth panel fabrics	54071044	
	Other umbrella cloth panel fabrics	54071094	

*\*source: IMAcS analysis, DGCI*

### **Quality Standards**

The requirements for complete umbrella are prescribed in IS: 2920/1964.

## Sewing Threads

Sewing threads are cabled yarn made out of natural fibre or synthetic fibre used for stitching and holding the fabric together in different applications like garments, shoes, leather products, quilts and mattresses, upholstery and any other product made of fabric or textile related items.

The history of sewing threads goes back to the very beginning of mankind, when slowly people learn to use plant fibres and old man's beard as thread. However, modern day thread came into existence only in 1730 when for the first time cotton was spun by machinery in England. Later in 1955 synthetic threads of polyester was commercially started and it spread across like wild fire becoming more popular than traditional threads by 1970s.

Sewing threads can be made from Natural fibres like cotton as well as synthetic fibres. In Natural fibres cotton fibre is most preferred due to its easy sew-ability, as compared to silk or linen which is much costlier. Sewing threads from Natural fibres can be of three types –

1. **Threads with soft finish** – These do not require any processing and are relatively cheaper but have low strength and high shrinkage.
2. **Threads with gassed finish** - The cotton sewing thread is passed through flame in high speed to reduce the fuzz and increase sheen.
3. **Threads with glazed finish** – These are treated with wax and a chemical to provide the glossy finish. These have higher tensile strength and are harder. These are used for seeing of heavy materials like tents, canvas and leather.
4. **Mercerized thread** – These threads are treated with caustic soda to make them smooth, long and lustrous with high strength. These are, mostly used in cotton and other garments.

In addition to these, synthetic fibres like Nylon and Polyester are often used as threads due to their high tensile strength, high abrasion resistance and lesser shrinkage. Most of these are missed with cotton to create combination threads that have high strength as well as better sew-ability of cotton. Different types of synthetic sewing threads used for common applications are:

1. Poly propylene sewing threads
2. Polyester continuous filament threads
3. 100% spun polyester threads
4. High tenacity lubricated polyester braids
5. Nylon 6 sewing threads

6. Nylon 6, 6 sewing threads

Sewing threads used in cloth-tech industry have four common types –

1. **Twisted threads** - Twisted threads are sewing threads having a balanced twist. Here the staple is first twisted together to form a single ply thread, two or more of which are then twisted together in reverse direction to make the balanced twisted sewing thread.
2. **Core spun threads** – Here a continuous filament of polyester is sheathed in either polyester or cotton to make a single ply thread, two or more of which are then twisted together in reverse direction to make sewing thread
3. **Monofilament Threads** – these are a single filament or nylon or polyester without any processing used as it is for cheap low cost garmenting or blind hemming. These are uncomfortable and come in natural colour of nylon or polyester.
4. **Textured Threads** – These are made of multi filaments that have been crimped, twisted and untwisted to provide the thread with elasticity, strength and goods coverage.

The essential properties for sewing threads are:

1. Uniform diameter and surface lubricity
2. Balanced twist
3. Resistance to needle heat
4. Free of knots and breakages
5. High abrasion resistance and shrink resistance
6. High elasticity and strength
7. High durability

The common applications and specifications for sewing threads have been mentioned as under –

Exhibit C-159: Sewing threads application in garments

Application	Fabric GSM	Tex specification	Average strength	
Garments	Extra light	< 135	18	850
			21	950
	Light	135 – 205	24	1050
			30	1250
	Medium	205 – 270	40	1850
			60	2950
	Heavy	270 – 408	80	3550
			105	4450
Ex Heavy Wt	408 & above	120	5500	

Application		Fabric GSM	Tex specification	Average strength
			120	5500
			150	7400
			180	9800
			220	10500

Exhibit C-160: Other Applications of sewing threads

Application	Tex	Application	Tex
Premium leather	60,40,20	Soft luggage	40,30,20
Economy leather	60,40,20	Mattress and quilting	60,40
Canvas	60,40,20	Saddlery	25,15
Sole stitching	8 ,7	Outdoor application	40,20,15
Apparels (leather)	75,50,36	Filter cloth	40
Accessories(leather)	75,50,36	Compressor winding	8
Automotive upholstery	60,40,20	Curtain and tents	40

### Market size and trade trends

Sewing thread being a key component in the stitching, the demand for sewing thread is derived from various end applications such as apparel, hosiery, embroidery, footwear, leather goods and many other industrial goods. The demand from apparels and hosiery are the key segments as they contribute to more than 50% of the market for sewing threads. Price and product availability are important criteria for majority of the applications

### *Market size estimate*

The market size of sewing thread has been estimated using the consumption norms and requirements for different applications and then triangulated using supply side information. The estimated market size for sewing thread industry in India is Rs. 4,246 Crore with a domestic market of Rs. 4081 Crore.

Exhibit C-161: Market size estimate

	2012-13
<b>Quantity (in '000 MT)</b>	168
<b>Value (in Rs. Crore)</b>	4,246

\*source: IMAcS analysis, industry sources

### **Key growth drivers and Inhibitors**

Apparel industry in India is the key driver for the sewing thread market, with close to 90% of the sewing threads being used in apparel and knitting industry. The market is expected to grow at 6% in line with the GDP and the apparel industry.

### **Key Manufacturers**

Key manufacturers of sewing thread in India are:

- Vardhaman Mills.
- Madura Coats
- Precot Meridian
- Pashupati Thread
- Lohia Thread
- KTL Ltd.

### **Import export scenario**

The imports of sewing threads have seen tremendous growth in the last five years reaching a total of Rs. 300 Crore. The exports on the other hand have seen a stable growth at 4% per annum reaching a total of Rs. 165 Crore.

Exhibit C-162: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5204</b>	Cotton thread, sewing, containing any synthetic staple fibre	52041110	Rs. 300 Crore
	Embroidery cotton thread (HS code of containing 85% or more by weight of cotton: embroidery cotton thread)	52041130	
	Cotton sewing thread not containing any synthetic staple fibre	52041140	
	Cotton sewing threads having 85% or more of cotton by weight - others	52041190	
	Sewing thread containing less than 85% by weight of cotton not put up for retail sale	52041900	
	Cotton thread, sewing, containing any synthetic staple fibre	52042010	
	HS code of put up for retail sale: cotton thread, darning	52042020	
	Embroidery cotton thread (HS code of put up for retail sale: embroidery cotton thread)	52042030	

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HS code family	HS code description	Applicable HS codes	2012-13
	Cotton sewing thread not containing any synthetic staple fibre	52042040	
	Other cotton sewing thread	52042090	
<b>5401</b>	Sewing thread of synthetic filaments	54011000	
	Sewing thread of artificial filaments	54012000	
<b>Exports</b>			
<b>5204</b>	Cotton thread, sewing, containing any synthetic staple fibre	52041110	Rs. 165 Crore
	Embroidery cotton thread (HS code of containing 85% or more by weight of cotton: embroidery cotton thread)	52041130	
	Cotton sewing thread not containing any synthetic staple fibre	52041140	
	Cotton sewing threads having 85% or more of cotton by weight - others	52041190	
	Sewing thread containing less than 85% by weight of cotton not put up for retail sale	52041900	
	Cotton thread, sewing, containing any synthetic staple fibre	52042010	
	HS code of put up for retail sale: cotton thread, darning	52042020	
	Embroidery cotton thread (HS code of put up for retail sale: embroidery cotton thread)	52042030	
	Cotton sewing thread not containing any synthetic staple fibre	52042040	
	Other cotton sewing thread	52042090	
<b>5401</b>	Sewing thread of synthetic filaments	54011000	
	Sewing thread of artificial filaments	54012000	

\*source: IMAcS analysis, DGCIIS

### Quality Standards

The relevant BIS standards are: IS 1066: 1980, IS 1376: 1998, IS 1720: 1978, IS 2196: 1985, IS 4229: 1992, IS 9543: 1980

## 8. Hometech

The Hometech segment of technical textiles comprises of the textile components used in household applications. These products range from blinds used in the houses to the filter products used in the vacuum cleaners. They are an important component in the mattress and pillows as well. They are made of both natural and synthetic fibres. For example, carpet backing cloth is made from jute as well synthetic fibres.

### List of Products

The major products under the segment have been listed as under:

- Fiberfil
- Mattress and pillow components
- Carpet backing Cloth (Jute & Synthetic)
- Stuff Toys
- Blinds
- Filter fabrics for HVAC and Vacuum cleaner
- Nonwoven wipes
- Mosquito nets
- Furniture fabrics and other coated fabrics

### Market size and trends

The total estimated market size of hometech is estimated to be Rs. 6,304 Crore. 90% of the total market is dependent on the domestic consumption with exports accounting for only 10% of the market. Most of the market is catered by domestic production with imports catering to only 7% of the market. The product wise market size has been shown in the exhibit below.

Exhibit C-163: Market size estimation

Product	2012-13 (All figures in Rs. Crore)				
	Production	Import	Export	Domestic Consumption	Market size
Fibre fill	400	0	130	270	400
Ticking fabric	448	0	0	448	448
Carpet Backing cloth	217	3	0	220	220
Stuff toys	1076	8	4	1080	1084

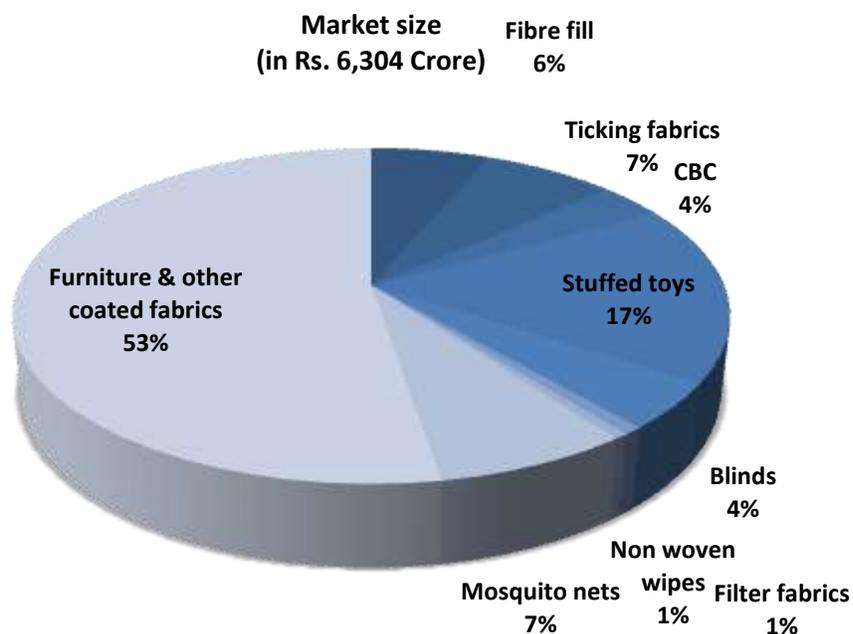
Product	2012-13 (All figures in Rs. Crore)				
	Production	Import	Export	Domestic Consumption	Market size
Blinds	282	1	0	283	283
Filter fabrics	40	7	0	47	47
Nonwoven wipes	32	2	0	34	34
Mosquito nets	434	37	1	470	471
Furniture & other coated fabrics	2942	375	522	2795	3317
<b>Total</b>	<b>5871</b>	<b>433</b>	<b>657</b>	<b>5647</b>	<b>6304</b>

\*Source: IMAcS analysis

Market size is calculated as exports + domestic market

The market is mainly constituted by furniture fabrics having 53% share with 17% share of stuffed toys. Most of the other segments have relatively smaller share due to their specific applications. The market is mostly governed by the domestic market with only 10% of exports mainly in the furniture fabric segment. Product segment wise market share has been shown in the exhibit below.

Exhibit C-164: Market size pie product wise



### Players & Profitability

The key players of the segment have been listed as under:

- Reliance Industries Ltd.
- Ganesha Ecosphere Ltd.
- Global Textile Alliance – Tirupur
- Gloster Jute Mills
- Hanung Toys and Textiles Ltd.
- Pal Plush Ltd.
- Hunter Douglas India
- Alps Industries
- Mac Decor
- Aerolux India Ltd
- Thermadyne Private Limited (Faridabad),
- Spectrum Filtration Pvt. Ltd (Kolkata),
- Ginni Filaments
- Pristine Care Products
- Precot Meridian
- Flocksur India Ltd
- Chiripal Industries
- Jasch Industries

The detailed analysis of each product has been done in the subsequent sections.

## Fibre fill

Fibre fill is basically Polyester Staple Fibre (PSF) used as fillings for home furnishing items like mattresses, pillows, cushions, sleeping bags, insulated quilts and garments and stuff toys.

### *Product characteristics*

Fibre fill is available in deniers ranging from 2 to 20 however the most common types of fibre fill used for stuffing purpose are 6 D and 15 D. The fibres are available in cut lengths of 32mm, 40mm, 44mm, 51mm, 64mm, 76mm, 88mm, 108mm and 128mm. However, the normal cut lengths used for filling are 32mm (for blow filling), 51mm and 64mm. The specification of fibre fill along with their tentative usage has been mentioned as under:

1. For filling in Mattresses - 6 Denier to 15 Denier
2. For Carpet Manufacturers – Around 15 Deniers
3. For non woven – 40 Denier
4. For utensil cleaning applications – 70 Denier

Fibre fill can be broadly classified as based on nature of production, cross section and finish as follows

### *Classification of Fibre fill*

Based on Manufacturing Process	Based on Cross section	Based on Finish
<ul style="list-style-type: none"><li>• Virgin PSF</li><li>• Regenerated PSF</li><li>• Conjugated PSF</li></ul>	<ul style="list-style-type: none"><li>• Hollow</li><li>• Solid</li></ul>	<ul style="list-style-type: none"><li>• Siliconised</li><li>• Non siliconised</li></ul>

Virgin fibre fill is prepared from virgin polyester produced from cracking of hydrocarbons and hence the name. Whereas, regenerated is produced from recycled PSF produced from PET bottles re-cycling. Reliance is the only major player of Virgin PSF in India while regenerated is produced by many small players located mostly in Delhi/ NCR and Uttar Pradesh.

Solid and hollow is classification based on cross section. Hollow fibre fill is lighter and occupies same area with 15% to 20% lesser weight. It is also more comfortable and softer than solid PSF and hence is preferred over solid fibre fill which is heavier. Conjugated is the third kind of fibre fill which is slowly gaining market due to its longer life and very comfortable feel. Currently only Reliance supplies conjugated fibre fill under its brand Recron.

### **Key Applications**

The common applications for fibrefill is mostly as filling for mattresses, pillows, cushions, soft toys and winter wears like jackets. While Cotton has been the traditional filling material being used in India, fibrefill has many advantages over cotton and hence is slowly gaining market over cotton fillings. These are:

- Better filling and greater softness than cotton and other fibres of equivalent weight. The filling quantity required with fibrefill is 70-80 % of the filling quantity with cotton
- Moisture and mildew resistance which avoids infestation. Hence fibrefill has a much longer life as compared to cotton.
- Enhanced air circulation (especially for hollow PSF)
- Better bounce and does not become flat with repeated usage.
- Durability
- Washability (hollow PSF retain bulk and shape after wash)
- Fibrefill is not affected by moisture and hence there is lesser chances of an infection through fibrefill. Along with this, lower weight of conjugated fibre fill makes it the most suitable filling for soft toys.

### **Market size and trade trends**

Based on the production data of PSF fibre fill in India in 2011-12, the estimated market including exports for fibre fill in India is Rs. 400 Crore with a domestic market of Rs. 270 Crore.

Exhibit C-165: Market size estimate

	2012-13
Quantity (in '000 MT)	50
Value (in Rs. Crore)	400

\*source: IMAcS analysis, industry sources,

### **Key growth drivers and Inhibitors**

The major growth drivers for the Fibre fill industry in India in the coming future:

- **Increasing preference for fibrefill** – with the growing living standard, many people mostly in urban areas are preferring fibrefill over cotton fillings, as a result market for fibrefill is expected to increase in the coming future. This is expected to be a major driver for fibre fill industry
- **Soft toys Industry** – The soft toy industry although a small part of the entire toy industry, is slowly gaining momentum with many children preferring soft toys related to Disney and other

cartoon characters. With the growth rate of soft toy industry expected at 20%, fibre fill demand would also increase hand in hand with it.

### Impediments

- **Usage of cotton as substitute to fibrefill** – Although market for fibre fill is growing, cotton still remains as the most preferred filler in the rural areas, hence creating a barrier for expansion of fibre fill in the vast rural market.
- **Higher demand for Polyester yarn** - As fibre fill and polyester yarn can both be produced from PSF. The higher demand and better returns in the yarn industry is a major deterrence for fibre fill, as many manufacturers provide preference to production of polyester yarn as compared to fibre fill.

The market of PSF fibre fill is expected to grow at around 6% per annum during the next three years.

### Key Manufacturers

Key manufacturers of fibre fill in India are:

- Reliance Industries Ltd.
- Ganesha Ecosphere Pvt. Ltd.
- Nirmal Fibres
- KK Fibres.

### Import export scenario

Export of fibre fill from India has increased considerably over time almost reaching double of what it was in 2007-08. The high growth in 2012-13 can be attributed to the favourable exchange value of dollars with respect to rupee that incentivised manufacturers to go for exports.

Exhibit C-166: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5503</b>	Man-made staple fibres, Synthetic staple fibres, not carded, combed or otherwise processed for spinning. -Of polyesters	5503200	Insignificant
<b>Exports</b>			
<b>5503</b>	Man-made staple fibres, Synthetic staple fibres, not carded, combed or otherwise processed for spinning. -Of polyesters	5503200	Rs. 130 Crore

\*source: IMAcS analysis, DGCIS

**Quality Standards**

There are no set quality standards for fibrefill in the BIS

## Ticking fabrics

A mattress is a mat or pad usually placed atop a bed. Mattresses can be broadly classified as:

- Foam mattresses
- Coir mattresses
- Spring mattresses

Mattresses are made of a filling material like coir, foam etc which provides support to the body. Traditional Indian mattresses are thick quilts made up of cotton stuffing. The protective fabric cover which encases the mattress is called ticking. Ticking fabric holds the filling material in place. It is usually made of cotton and comes in a wide variety of colours and styles. The GSM of the fabric varies from 80 to 200.

### Product Characteristics

The typical sizes of mattresses are given in the following table:

Mattress sizes			
Class	Dimensions in inches	Class	Dimensions in inches
Divan	72"X30"	Queen	72"X60"
	75"X30"		75"X60"
	78"X30"		78"X60"
Single	72"X36"	King	72"X72"
	75"X36"		75"X72"
	78"X36"		78"X72"
Twin	72"X48"		
	75"X48"		
	78"X48"		

The most commonly available mattresses are 72" X 36" in Northern India and 78" X 36" in rest of the country. The typical value and quantity wise break up of a mattress is given in the following table.

Raw Material	% by Value	Average Weight per Mattress
<b>Foam + Coir</b>	75%	Ranges from 5-6 Kg (Foam only) to 10-15 Kg*(Foam & Coir)
<b>Fabric</b>	10%	1-2 Kg
<b>Packaging and Others</b>	15%	1-2 Kg

*\*Depends on the ratio of foam and coir used in the mattress and the density. Sleepwell manufactures the mattresses with densities varying between 10 and 85. Density of 1 indicates that the material carries 1 Kg weight per cubic meter. Generally 60:40 Coir: Foam ratio is used since this reduces the product price and also helps save excise duty as coir based products (i.e. products with more than 50% by weight of Coir) are exempted from excise duty.*

Pillows can be made of variety of filling material like cotton, feathers and foam etc. Pillows are available in variety of sizes i.e. 21"X14", 24"X16" and 26"X17". The ticking fabric used for pillow is also generally made of cotton with a GSM lesser than that of the fabrics used for mattresses.

### **Market size and trade trends**

The market for ticking fabrics has been derived from the estimated market for mattress and pillows using NSSO figures for monthly per capita consumption. The different usage norms considered for calculations are as listed:

Parameter	Value
<b>Mattresses</b>	
Ticking fabric	5 square metre
Price per square metre of ticking	Rs 120 per square meter
Tape	13 meter
Price per square metre of ticking tape	Rs 50 per square meter
<b>Pillows</b>	
Ticking fabric	0.6 square metre
Price per square metre of ticking	Rs 120 per square meter

### ***Market size estimate***

The estimated market size for ticking fabric and tape for 2012-13 based on preliminary analysis is Rs. 340 Crore for ticking fabric and Rs 108 Crore for ticking tape.

**Exhibit C-167: Market size estimate**

	2012-13	
	Ticking fabric	Ticking tape
<b>Quantity (in Mn. Sq. mtrs.)</b>	28	22
<b>Value (in Rs. Crore)</b>	340	108

*\*source: IMaCS analysis, industry sources*

### ***Key growth drivers and Inhibitors***

The demand for ticking fabric is directly related to the market demand for Mattresses. The growth of organised mattress industry is the largest driver for ticking fabric industry, as it promotes use of ticking fabric instead of any normal fabric which is generally used in local production. Lack of awareness about the benefits of ticking fabric over normal fabric is another reason why local manufacturers often go for

normal fabric in order to reduce manufacturing costs. Growth of the organised sector with proper awareness about ticking fabric is expected to drive the market in the coming future. The market is expected to grow at 8% per annum during the next three years.

### Key Manufacturers

The largest manufacturer of ticking fabrics in India is Global Textile Alliance – GTA. Besides GTA the industry is constituted by mostly Small scale players.

### Import export scenario

The import and export of ticking fabric from India is insignificant

Exhibit C-168: Import export trends

HS code family		Applicable HS codes	2012-13
<b>Imports</b>			
<b>5208 &amp; 5209</b>	Bed ticking - domestic (HS Code of Plain weave (85% cotton by wt .), weighing more than 100 g/m2 but less than 200 g/m2)	52083250	-
	HS Code of Plain weave, weighing not more than 100 g/m2: Bed ticking, domestic	52084140	
	Bed ticking - domestic (HS Code of Plain weave, weighing more than 100 g/m2: Bed ticking, domestic)	52084250	
	Bed ticking, domestic	52084330	
	Plain weave: Bed ticking, domestic (Harmonised Codes of Woven fabrics of cotton, containing 85% or more by weight of cotton, weighing more than 200 g/m2)	52095160	
<b>5305</b>	HS Code of Coconut, abaca (Manila hemp or Musa textilis Nee), ramie and other vegetable textile fibres, not elsewhere specified or included, raw or processed but not spun; tow, noils and waste of these fibres (including yarn waste and garneted stock): Coir mattress fibre	53050020	
	Curled coir fibre/machine twisted fibre	53050030	
<b>6306</b>	Pneumatic mattresses	63064000	
	Pneumatic mattresses of cotton	63064100	
	Pneumatic mattresses of other textile material	63064900	
<b>Exports</b>			
<b>5208 &amp; 5209</b>	Bed ticking - domestic (HS Code of Plain weave (85% cotton by wt .), weighing more than 100 g/m2 but less than 200 g/m2)	52083250	-

HS code family		Applicable HS codes	2012-13
	HS Code of Plain weave, weighing not more than 100 g/m <sup>2</sup> : Bed ticking, domestic	52084140	
	Bed ticking - domestic (HS Code of Plain weave, weighing more than 100 g/m <sup>2</sup> : Bed ticking, domestic)	52084250	
	Bed ticking, domestic	52084330	
	Plain weave: Bed ticking, domestic (Harmonised Codes of Woven fabrics of cotton, containing 85% or more by weight of cotton, weighing more than 200 g/m <sup>2</sup> )	52095160	
<b>5305</b>	HS Code of Coconut, abaca (Manila hemp or Musa textilis Nee), ramie and other vegetable textile fibres, not elsewhere specified or included, raw or processed but not spun; tow, noils and waste of these fibres (including yarn waste and garneted stock): Coir mattress fibre	53050020	
	Curled coir fibre/machine twisted fibre	53050030	
<b>6306</b>	Pneumatic mattresses	63064000	
	Pneumatic mattresses of cotton	63064100	
	Pneumatic mattresses of other textile material	63064900	

\*source: IMAcS analysis, DGCI

### Quality Standards

The relevant BIS standards are given in the following table

Exhibit C-169: Standards for Mattresses

BIS Code	Description
IS 7933: 1975	Specification for Flexible Polyurethane Foam for Domestic Mattresses
IS 9491: 1980	Specification for mattress, air
IS 13013: Part 1: 1990	Code of practice for packaging thermal insulation materials: Part 1 Slabs, mattresses and pipe-sections made of fibrous materials
IS 13489: 2000	Textiles - Bed Mattress - Specification

## Carpet backing cloth (CBC)

A carpet is any loom-woven, felted textile or grass floor covering. The global carpet market for domestic and industrial end use is dominated by several varieties of carpet such as Hand Knotted Carpets, Hand Woven Carpets, Tufted carpets, Needle felt carpets, Flat weave carpets, etc. Carpet Backing Cloth (CBC) is used as the backing material for both woven and tufted carpets as depicted in the figure below:

CBC is generally classified into two categories:

- **Primary Carpet backing:** The base fabric on which pile yarns are tufted and anchored to make a carpet
- **Secondary Carpet backing:** Fabric bonded on the backside of the carpet forming an underlay.

Primary backing is used for making the carpet in which yarn is woven or tufted. Carpet after being dyed is sent for secondary backing. Here the surface is smoothened and backing is applied. Latex is applied on the back of the carpet by passing the carpet through the puddle of latex. Latex is forced down by the blade around all the yarn on the back of the carpet, which locks the yarn into the backing. A second coat of latex is applied thereafter which holds the secondary backing onto the tufted material. The secondary backing provides dimensional stability while locking individual tufts in place.

### Product Characteristics

Primary backing is manufactured mainly from synthetic fabric. Secondary backing is made of both jute and woven polypropylene. Jute carpet backing cloth is approximately 104" wide with gsm varying between 180 and 407. Jute backing has certain limitations such as potential for browning and rotting. Thus, the secondary backings used today are majorly woven polypropylene made of a leno weave of slit film and spun olefin yarns that forms a stretchable secondary backing fabric. Synthetic carpet backing cloth is available in many varieties of which some are:

Application	Fabric characteristics	
<b>Primary Backing Fabric</b>	spun polyester warp, spun polyester weft; 40 ends per 10 cm and 40 picks per 10 cm	149 gsm
<b>Primary Backing Fabric</b>	spun polyester warp, spun polyester weft; 70 ends per 10 cm and 70 picks per 10 cm	266 gsm
<b>Secondary Backing Fabric</b>	polypropylene warp, acrylic weft; 32 ends per 10 cm and 40 picks per 10 cm weft	78 gsm
<b>Secondary Backing Fabric</b>	cotton yarn nm 40/2 warp, nm 3.6/1	135 gsm

Application	Fabric characteristics
<b>Fabric</b>	weft; 35 x 2 ends per 10 cm warp and 32 picks per 10 per cm

Carpet backings without latex are also being produced by some manufacturers. This system eliminates de-lamination and thus, such carpets are light weight, more flexible, easier to install and can be recycled easily. This also eliminates the "new carpet odour".

### Market size and trade trends

CBC is used as primary and secondary backing for carpets. Thus, growth in the carpet industry is the key demand driver for CBC. The Indian carpet industry is driven by exports. Around 95% of the carpets made in India are being exported. The carpet export witnessed a decline in recent years because of rupee appreciation against dollar. As per discussions with industry experts and key industry players the carpet exports is expected to remain stagnant in future thus, limiting the growth potential of CBC. However, marginal growth is expected in the synthetic CBC only because of replacement of jute by the synthetic category.

In the last few years, the demand for CBC as primary backing has minimized as artisans are increasingly using fabric as primary backing to minimize costs. In light of this, the market size of CBC has been calculated considering usage in secondary backing only.

### *Market size estimate*

CBC is used in machine tufted carpets and not in hand knotted ones. With the coming of synthetic backings, the use of jute backing has declined over a period of time to less than 10% of total backing. Taking the total production of carpets in India as per the statistics at National Jute board and working report on handicrafts, the market of carpet backing cloth (CBC) has been estimated.

**Exhibit C-170: Market size estimate**

	2012-13
<b>Quantity (in MT)</b>	4,860
<b>Value (in Rs. Crore)</b>	220

*\*source: IMaCS analysis, industry sources*

The market for CBC has de- grown by 6% because CBC is no longer used as primary backing for the carpets.

### **Key growth drivers and Inhibitors**

- The key driver for CBC industry is the growing export demand for Indian carpets. As 95% of the carpet made in India is exported, the entire market is dependent on export demand.
- The industry also faces stiff competition from use of latex as carpet backing. While synthetic backing replaced jute due to price considerations, the industry faces similar competition from latex.

The market of CBC is expected to grow at a slow rate of 4% per annum driven primarily by the carpet industry of India.

### **Key Manufacturers**

Key manufacturers of CBC are Auckland International, Gloster Jute Mills, Chev-Jute and Champadany Industries Limited. Besides these are a number of SME Players in the industry.

### **Import export scenario**

Although the import and export of CBC was very small, over years it has seen a declining trend. The import of carpet backing has declined over the last five years at 18% y-o-y and currently is just Rs. 3.3 Crore. Exports of CBC in 2012-13 was insignificant

Exhibit C-171: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5301</b>	Woven fabrics of jute or of other textile bast fibres excluding flax, true Hemp & Ramie	53011011	Rs. 3 Crore
<b>5407</b>	Woven fabrics of synthetic filament yarn, including woven fabrics obtained from materials of 67 decitex or more	54072010	
<b>Exports</b>			
<b>5301</b>	Woven fabrics of jute or of other textile bast fibres excluding flax, true Hemp & Ramie	53011011	-
<b>5407</b>	Woven fabrics of synthetic filament yarn, including woven fabrics obtained from materials of 67 decitex or more	54072010	

\*source: IMAcS analysis, DGCIS

### **Quality Standards**

There are no set quality parameters for carpet backing cloth.

## Stuff toys

Stuff toys are soft knitted fabrics in different appealing shapes filled with either cotton or fibre fill. These are usually available in shape of some cartoon characters or in shape of animals and plants appealing mainly to kids in lower age group. These are often used as a decorative at homes.

### *Product Characteristics*

The outer fabric is generally made of fur, fleece or flock fabric with most of the fillings of fibrefill, paper foam or cotton depending on the costing. The stuffed toys come in a variety of sizes varying from 6 cm to 200 cm with a price range from Rs. 50 to a few thousands based on the construct and material used as filling and fabric.

### Market size and trade trends

The purchase of stuffed toys is mostly done by women. As most purchases are done for kids and infants, the hygiene level of the filling material and the fabric becomes a major decision factor. It is an impulse buy product, and looks as well as feel of the product play a major role in making the decision. The market for stuffed toys is generally driven by repeat purchases by a very small segment of the society. New customers are very few. Another major factor governing the market is that people tend to prefer quantity over quality. Hence, one would prefer many cheap stuffed toys rather than a single costly one

### *Market size estimate*

The market of stuff toys has been estimated based on inputs from the industry. Stuff toys constitutes nearly 12% to 15% of the total toys market of India. Considering the production figures of major players like Hanung Toys and Textiles and the market size of toy industry as per Assocham reports, the market for stuff toys is estimated to Rs. 1080 Crore.

Exhibit C-172: Market size estimate

	2012-13
Quantity (in Mn. pieces)	150
Value (in Rs. Crore)	1080

*\*source: IMAcS analysis, industry sources*

The market has grown at 27% owing to the increasing preference for life style products.

### *Key growth drivers and Inhibitors*

The major growth drivers for the Soft toys industry in India in the coming future are:

- **Increasing income levels** – with the growing living standard and income standards, many people mostly in urban areas prefer to buy stuffed toys of better quality and filling as compared to others, particularly purchasing the same from reputed stores and are willing to pay higher for better quality. This is a major growth driver for the organised stuffed toys industry, which is expected to grow at 20% owing to increasing purchases.
- **Increasing reach of cartoon characters through Television** – With the plethora of cartoon characters attracting the children, the scope of different designs of stuffed toys have increased. In addition, with the current penetration level of cartoons, many children are interested in buying stuffed toys of cartoon characters giving a boost to the market.

#### **Impediments**

- **Poor piracy laws** – Stuffed toys industry is mostly driven by cartoon characters. Due to poor piracy laws, it is very easy for an un-organised player to copy a high selling design and sell it at a much lower price, thereby increasing stiff price competition.
- **Competition from China** – China is a major supplier of cheap toys to India be it stuffed toys or otherwise. With heavy competition from China, most Indian manufacturers find it hard to produce stuffed toys at a price point that is cheap and profitable.
- **Lack of shelf space** - Stuffed toys are impulse purchases which require a frontal position on the shelf. However, due to their voluminous shapes, they are generally kept at the back, with the shelf space given to remote control cars and electronic toys, which are a high demand segment of the toys industry.

The market for soft toys is expected to grow at 15% per annum during the next three years, owing to the increased usage as life style products.

#### ***Key Manufacturers***

Hanung toys and Textiles is the largest manufacturer of stuffed toys producing 27.5 million pieces per annum. Besides Hanung players like Pal plush and Archies also manufacture stuff toys.

#### ***Import export scenario***

The import of stuff toys has been increasing on account of cheaper products from China, which has increased competition in Indian markets. Imports have gone up from Rs. 5.5 Crore to Rs. 8 Crore in a span of last five years. The export market has also increased over the last five years reaching Rs. 4 Crore

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Exhibit C-173: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>9503</b>	DOLLS OF WOOD (HS Code of Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds: Of wood)	95030010	Rs. 8 Crore
	DOLLS OF PLASTIC (HS Code of Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds: of plastic)	95030030	
	OTHER -HS Codes of Other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds	95030090	
	HS code of stuffed toys -(Family head - Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds)	95034100	
	others -HS Codes of Other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds	95034990	
	Toys, games and sports requisites; parts and accessories there of - Festive, carnival or other entertainment articles, including conjuring tricks and novelty jokes. In Particular Articles for Christmas festivities - 'ARTICLES FOR CHRISTMAS FESTIVITIES	95051000	
<b>Exports</b>			
<b>9503</b>	DOLLS OF WOOD (HS Code of Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds: Of wood)	95030010	Rs. 4 Crore
	DOLLS OF PLASTIC (HS Code of Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds: of plastic)	95030030	
	OTHER -HS Codes of Other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds	95030090	
	HS code of stuffed toys -(Family head - Tricycles, scooters, pedal cars and similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds)	95034100	

HS code family	HS code description	Applicable HS codes	2012-13
	others -HS Codes of Other toys; reduced-size ("scale") models and similar recreational models, working or not; puzzles of all kinds	95034990	

\*source: IMAcS analysis, DGCIS

### Quality Standards

The stuffed toys should be Azo free and also free from harmful substances like lead and cadmium which can be very harmful to the kids. The quality standards applicable to stuffed toys are:

BIS Code	Description
IS 9873: Part 1: 2001	Safety Requirements for Toys - Part 1: Safety Aspects related to Mechanical and Physical Properties
IS 9873: Part 2: 1999	Safety Requirements for Toys - Part 2: Flammability Requirements
IS 9873: Part 3: 1999	Safety Requirements for Toys - Part 3: Migration of Certain Elements

In addition, the standards applicable to the toy industry are EN-71, ASTM, BS-5665, AS1647, CPSC etc.

## Blind and blind fabrics

Window blinds are blinds used for covering and shading of windows so as to allow optimum amount of light as required. These are substitute of curtains made up of blind fabric, threads and supporters made of wood, metal or plastic components. The fabric used in blinds is termed as blind fabric and it is the technical textile component of the window blind. These fabric special properties of temperature control, opacity and or fire retarding properties either due to the virtue of the raw material used or through technical coatings on the fabric.

### *Product Characteristics*

The blind fabric is then fabricated into strips of 25 cm width which are used along with slate and string to prepare the final blind. These strips can be cut to any length based on the requirement. Window blinds are mainly of three types:

1. Vertical blinds – these have longitudinal strips of fabrics which can be rotated to up to 90 degree for exposure of light. These are now less commonly used and are quickly being replaced by roller blind which is in fashion.
2. Roller blinds: - These have horizontal strips of blind fabrics supported by strings. These are now commonly used due to its ease of operation and better lighting.
3. Venetian blinds – Venetian blinds are window blinds have wood strips instead of fabrics. These are commonly used for aesthetic places like restaurants.

Blinds are made of variety of materials; the material chosen depends on the aesthetic and functionality required. The desired functional performance include light and glare control, desired outside view, ease in handling and maintenance, acoustic performance, etc. The most common window blinds are Slat blinds, which consist of many horizontal slats, usually of metal or vinyl, connected with string in such a way that they can be rotated to allow light to pass between the slats, rotated up to about 170 degrees to hide the light, or pulled up so that the entire window is clear. Vertical blinds consist of slats of stiffened fabric, plastic, or metal hanging by one end from a track. Like the horizontal versions, the slats can be rotated 90 degrees to allow light to pass through or to fold up on one side of a door or window. Vertical blinds exhibit better control over the extent of natural or exterior light entering the room because of the ability of slats to close tightly.

Venetian blinds have horizontal slats, one slat above another. They are suspended by strips of cloth called tapes or by cords which are able to tip them each at the same time up to 180 degrees. There are also lift cords passing through holes in each slat. When these cords are pulled, the bottom of the blind

moves upward causing slats to rest on each other as the blind is raised. Venetian blinds are basic slatted blinds made of metal or plastic; wooden slats are sometimes used but these are usually referred to as wood blinds or bamboo blinds. Slat width varies between 16 mm and 120 mm, the most common width being 50 mm.

Other varieties of window blinds include Mini blinds (venetian blinds with very narrow slats usually 25 mm wide), Micro blinds (with slats usually 12 mm wide), Louvers (fabric or poly vinyl), Jalousies, Brise Soleil, Holland blinds, Pleated blinds, Honeycomb blinds (similar to pleated shades except that there are two or more layers joined at the pleats to form compartments that trap air, providing insulation), Roman shades, and roller shades. The Louvers vary in width from 50 mm to 125 mm, but the most popular ones are the 100 mm louvers.

### **Market size and trade trends**

Market for blinds is mainly dependent on the institutional demands from Hotels, hospitals, office complexes and institutions. The total market for blinds has been estimated using the growth of office real-estate in India and its estimated blind requirement. The total domestic market for blinds is estimated to be Rs. 283 Crore.

Exhibit C-174: Market size estimate

	2012-13
Quantity (in Mn. metres)	5.7
Value (in Rs. Crore)	283

\*source: IMAcS analysis, industry sources

### ***Key growth drivers and Inhibitors***

The commercial establishments like offices, hospitals, hotels etc. account for majority of domestic demand for blinds. Vertical blinds are the most popular in offices whereas Roman blinds are used in hotels. Roman blinds are also preferred for farm houses. The growth in domestic demand for blinds is expected to be driven by the infrastructure development planned in the country. The market for blind fabric is expected to grow at 12% per annum with increase in penetration and growth of commercial real estate market.

### ***Key Manufacturers***

Key manufacturer of blind fabrics in India are Hunter Douglas India, Alps Industries, Mac Decor, Aerolux India Ltd and Accumax.

**Import export scenario**

Import of blinds and blind fabrics in India has considerable reduced over time indicating growth of indigenous manufacturing. The exports have also declined during the last five years.

**Exhibit C-175: Import export trends**

HS code family	HS code description	Applicable codes	HS	2012-13
<b>Imports</b>				
<b>5407</b>	Woven fabrics obtained from high tenacity yarn of nylon or other polyamides or of polyesters - bleached other polyester fabrics	54071029		Rs. 1 Crore
<b>5806</b>	narrow fabrics consisting of warp without weft assembled by means of an adhesive (bolducs).- Of cotton - 'narrow fabrics etc, other of cotton	58063190		
<b>7019</b>	HS Codes of Glass fibres (including glass wool) and articles thereof (for example, yarn, woven fabrics) Slivers, roving, yarn and chopped strands - made of 'other woven fabrics	70195900		
<b>Exports</b>				
<b>5407</b>	Woven fabrics obtained from high tenacity yarn of nylon or other polyamides or of polyesters - bleached other polyester fabrics	54071029		-
<b>5806</b>	narrow fabrics consisting of warp without weft assembled by means of an adhesive (bolducs).- Of cotton - 'narrow fabrics etc, other of cotton	58063190		
<b>7019</b>	HS Codes of Glass fibres (including glass wool) and articles thereof (for example, yarn, woven fabrics) Slivers, roving, yarn and chopped strands - made of 'other woven fabrics	70195900		

\*source: IMAcS analysis, DGCI

## Filter fabrics – HVAC and Vacuum Cleaner

Filter fabrics are used in home products like air conditioning, vacuum cleaner and HVAC – Heating Ventilation and Air Conditioning System, commonly known as Air Handling units (AHU). AHU is used to provide cooling and heating solutions for large spaces like offices, shopping malls, institutions, etc.

The HVAC filters include pre filters, medium efficiency filters and or High Efficiency Particulate Air (HEPA) filters. HEPA filters are high efficiency filters capable of removing 99.97% of airborne particles of 0.3 micrometers ( $\mu\text{m}$ ) diameter. Filters capable of removing 99.999% of dust, pollen, mold, bacteria and any airborne particles of size 120 nano metres or larger from the air are categorised as ULPA or Ultra Low Penetration Air filter

Vacuum cleaners have a filter to remove the dust from the exhaust air. The dust is collected in a paper bag which can be disposed off. Some of the vacuum cleaners also use HEPA filters.

### *Product Characteristics*

Filter media used in air filters are nonwoven fabrics laid perpendicular to the air flow to arrest the solid particulate matter. Air filters can be either mechanical filters or electrostatic filters (electro statically enhanced filters). Most of the filters fall under the category of mechanical filters and depend on four primary filtration mechanisms - sieving, impaction, interception, and diffusion. Filters are characterized by their filtration efficiency, MERV rating and Micron size.

**Filtration efficiency:** Filtration efficiency can be calculated using the following formula

$$\text{Filter Efficiency} = 1 - \frac{\text{Particles Downstream}}{\text{Particles Upstream}}$$

**MERV Rating** or Minimum Efficiency Reporting Value is a number from 1 to 16 that is relative to an air filter's efficiency. The higher the MERV, the more efficient the air filter is. A higher MERV creates more resistance to airflow because the filter media becomes denser as efficiency increases. The table below gives the application areas of various types of filters.

Exhibit C-176: Filter fabric applications

Filter Efficiency	MERV ratings	Application
-------------------	--------------	-------------

95%	>14	Final filter in hospital and other clean room HVAC systems.
85%	>13	Commercial applications like research Labs.
65%	>11	Standard commercial buildings, such as office space.
25%	>6	Pleated panel filters, used in office environments, and as pre-filters.
<20%	1 to 5	Pre filters, used in window and split air conditioners

**Micron size:** The micron size is indicative of the size of particles which can be removed by a particular type of filter. Based on this filters can be classified as follows:

Exhibit C-177: Filter fabric classification

Micron size	Classification
>10	Pre filter
5 to 10	Medium efficiency filters
< 5	High efficiency filters

The filter media should have appropriate anti static properties to prevent build up of static charge due to dust particles which can lead to an explosion. The pre filters are generally re-usable as they can be washed when the filter medium gets choked. The HEPA filters on the other hand are disposable type.

### **Market size and trade trends**

The demand for filter fabrics is mainly driven by HVAC filters and room AC filters. The demand for vacuum cleaner filters on the other hand is relatively much smaller. The market for filter fabrics is derived from the demand of HVAC systems. The HVAC industry can be broadly classified into the following two segments:

#### ***Split and window type air conditioners***

The type of filter used varies with each manufacturer. Most of the air conditioners use pre filters. The manufacturers have to balance the conflicting objectives of minimizing the power consumption and maintaining the air quality.

### **Centralized air conditioners**

The demand for centralized air conditioning is derived from various commercial and industrial buildings .Not much attention is given to the quality of air in most cases; cost minimization is the primary goal and hence pre filters are used. HEPA and microbe filters find application in Pharma & Electronics industries, nuclear installations, and hospitals etc where the quality of air is critical.

In a centralized air conditioner the filters are housed in the Air handling unit. An air handler, or air handling unit (often abbreviated as AHU), is a device used to condition and circulate air as part of a heating, ventilating, and air-conditioning (HVAC) system. Usually, an air handler is a large metal box containing a blower, heating and/or cooling elements filter racks or chambers, sound attenuators, and dampers. Air handlers usually connect to ductwork that distributes the conditioned air through the building, and returns it to the AHU. The AHU can have different combinations of pre filter, medium and high efficiency filters .The pre filters remove the large sized particles hence the higher efficiency filter is subject to lesser load.

Air conditioning products are now considered more as a necessity rather than a luxury. The rising disposable incomes and awareness among the people of the respiratory diseases, allergies etc indicate a huge potential for the industry.

### **Vacuum Cleaner filters**

The demand for vacuum cleaner filters is driven by the demand for vacuum cleaners. The use of vacuum cleaners is mainly concentrated in the urban areas. The demand for vacuum cleaners is triggered by increasing urbanisation & disposable incomes, increasing health awareness, unavailability and rising cost of domestic help and increasing number of working women. As per industry sources the demand is also getting a boost because of number of offices and households using carpets which necessitates use of vacuum cleaners.

### **Market size estimate**

The market size estimates for filters used in Room air conditioning, HVAC and vacuum cleaners are as shown in the exhibit below.

Exhibit C-178: Market size estimate

	2012-13		
	Filter in Room AC	Filter in HVAC	Filter in vacuum cleaners
<b>Quantity</b>	2.8 Mn sq. m	0.7 Mn sq. m	0.138 mn sq. m
<b>Value</b>	Rs. 35 Crore	Rs. 11 Crore	Rs. 1.73 Crore

\*source: IMAcS analysis, inputs from key players awaited

### ***Key growth drivers and Inhibitors***

The demand for room ACs and vacuum cleaners which are expected to grow at over 15% per annum and HVAC is expected to grow at 8% per annum. The overall market is expected to grow at 12% per annum in the coming three years.

### ***Key Manufacturers***

The major manufacturers of split and window type air conditioners are LG, Samsung, Videocon, Voltas, Blue star etc .Blue star and Voltas are also the leaders in centralized air conditioning industry with Blue star having a market share of around 30%. Some of the major manufacturers of Air filtration products are

- Thermadyne Private Limited (Faridabad),
- Spectrum Filtration Pvt. Ltd (Kolkata),
- Anfilco Limited(Gurgaon),
- CRE Industries (Delhi),
- John Fowler (Bangalore)

The filter manufacturers source the filter media from outside. Nonwoven filter media requirement is primarily met by imports. Some of the indigenous manufacturers /suppliers are

- Dinesh Mills,
- Supreme Nonwoven,
- Mech Tech Industries (Ahmedabad),
- Biyani Industrial Fabrics (Indore)

### **Import export scenario**

Filter fabric is only imported in India. The imports of filter fabric in India has declined at 12% y-o-y since 2007-08.

#### **Exhibit C-179: Import export trends**

<b>HS code family</b>	<b>HS code description</b>	<b>Applicable HS codes</b>	<b>2012-13</b>
<b>Imports</b>			
<b>5603</b>	man-made filament weighing between 70g/sqm and 150g/sqm	56031300	Rs. 7 Crore
	other filament weighing >150g/sqm (HS codes of nonwovens, whether or not impregnated, coated, covered or laminated- HS code for manmade filament )	56039400	

*\*source: IMAcS analysis, DGCI*

### **Quality Standards**

The relevant BIS standards is

<b>Standard</b>	<b>Description</b>
IS 7613: 1975	Method of testing panel type air filters for air conditioning and ventilation purposes

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards are also relevant for the Indian market.

## Non woven wipes for home use

A wipe is a small piece of cloth used for the purpose of cleansing or disinfecting. Wipes could be woven, knitted or nonwoven. Nonwoven wipes have recently gained popularity on account of their excellent absorption and softness. The product is available as dry wipe as well as wet wipe wherein the nonwoven fabric is impregnated with a solution.

Wet wipes are designed for specific application e.g. Baby wipes, Facial wipes, Cleansing wipes, Hand & body wipes, Moist towelettes, Personal hygiene wipes, Feminine hygiene wipes, Antibacterial wipes and Medicated wipes. The usage of baby wipes is well accepted as a convenient, portable, hygienic way to keep babies clean. Antibacterial wipes help to sanitize shopping trolleys, restaurant tables, etc. to reduce the exposure to germs. They also provide an easy way to maintain clean hands more effectively. Personal care wipes are specifically designed to carry cleansing crèmes with specific ingredients to help remove makeup. Wipes also find application in manufacturing and service industries especially in food service and health care. The success of nonwoven wipes is driven by their ease-of-use, disposability, portability and reduced risk of cross-contamination.

### ***Product Characteristics***

Non-woven wipes are made from viscose, polyester and polypropylene and are available in variety of sizes ranging from 2 X 5 square cm to 30 X 40 square cm. Majority of nonwoven wipes are manufactured by Spun lace technology. The wipes are expected to have the following properties:

- Smooth and soft texture
- Good absorbance characteristics

Good moisture retention properties

These wipes usually come in a pack of 80 wipes.

### **Market size and trade trends**

Busy lifestyle and high disposable income are the key factors for the acceptance of wipes. Wet wipes obviate the need for the use of separate 'wet and dry' combinations in cleaning tasks thus, allowing people to perform daily tasks in substantially less time. Currently the demand for wipes is limited in India but with growing number of middle class families, increasing disposable income and changing lifestyle the demand for wipes is expected to increase in the urban areas. Moreover, product innovations are further likely to boost the demand. Consumption of wipes in foodservice and health care applications is also expected to grow because of heightened health and hygiene concerns

### **Market size estimate**

The market of non woven wipes for home use has been estimated using key inputs from wipe manufacturers in India. As per industry sources, Ginni Filaments is one of the largest players producing non-woven wipes in India. Other key producer is Pristine Care products. In addition to these, Precot Meridian and Birla Cellulose have recently entered the wipe market. In addition to that Proctor and Gamble is also in process of opening a manufacturing centre for wipes and baby products in India. Earlier the market was mostly driven by imports, but with recent capacity additions, the share of imports in the market has reduced. Kimberly Clarke Unilever Ltd. is the largest seller of non woven wipes for home use, in India with more than 70% market share. However, the company is not involved in production of wipes and most of its demand is catered either by other suppliers like Ginni Filaments or through exports. Based on inputs of industry members, the market of non woven wipes is estimated to be of Rs. 35 Crore.

Exhibit C-180: Market size estimate

	2012-13
Quantity (in MT)	1429
Value (in Rs. Crore)	34

\*source: IMaCS analysis, industry sources

The market of wipes has grown by 14% over the last five years. However, it is only within last one year that many new players have come into the market by setting up their own production facilities in for non woven wipes.

### **Key growth drivers and Inhibitors**

The transition of Indian consumer towards easier and leisure products like wipes is occurring in a big ways, with many young people preferring the hassle free way of having a onetime use and throw wipes. The market has grown considerable in the last few years, encouraging many manufacturers to set up production units. The increased sense of hygiene and personal and skin care is a leading driver for growth of wipes industry. The industry also faces steep competition from paper based wipes in the dry wipe segment. The market for non woven wipes is expected to grow at 12% per annum during the next three years.

### **Key Manufacturers**

Ginni Filaments is the largest manufacturer of non woven wipes in India. Other key manufacturers in the industry are Pristine Care products and Precot Meridian.

### Import export scenario

India is an importer of non woven wipes. However, due to substantial capacity addition in the last one year in India the import of wipes has gone down from Rs. 15 Crore in 2011-12 to Rs. 2 Crore in 2012-13.

#### Exhibit C-181: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>4818</b>	Handkerchiefs, cleansing or facial tissues and towels - handkerchiefs, cleaning/facial tissue & towels	48182000	Rs. 2 Crore
	Paper and paperboard; articles of paper pulp, of paper or of paperboard // Toilet paper and similar paper, cellulose wadding or webs of cellulose fibres, of a kind used for household or sanitary purposes, in rolls of a width not exceeding 36 cm, or cut to size or shape; handkerchiefs, cleansing tissues, towels, tablecloths, serviettes, bed sheets and similar household, sanitary or hospital articles, articles of apparel and clothing accessories, of paper pulp, paper, cellulose wadding or webs of cellulose fibres of others - OTHR ARTCLS OF PAPER,PAPER PLP,CLLS WDNG ETC	48189000	
<b>5603</b>	Nonwovens, whether or not impregnated, coated, covered or laminated weighing between 25G/SQM and 70 G/SQM - MAN-MADE FILMNT WGHNG>25G /SQM	56031200	
	Nonwovens, whether or not impregnated, coated, covered or laminated weighing between 70G/SQM and 150 G/SQM - MAN-MADE FILMNT WGHNG BETWN 70G/SQM AND 150G/SQM	56031300	
<b>6307</b>	Floor-cloths, dish-cloths, dusters and similar cleaning cloths made of others- OTHERS	63071090	
	Other made up articles, including dress patterns of other materials - 'OTHR MADE UP ARTCLS OTHR THN COTTON	63079090	

\*source: IMAcS analysis, DGCIIS

### Machinery details

Over 50% of the nonwoven wipes are manufactured by Spun lace technology. The web formation for Spun lace production line utilizes carded web making technique.

The key machinery used for production of wipes is given below:

- Blow room
- Injection Cards
- Spun lace hydro entanglement line
- Dryer
- Winder

- Slitter
- Folding and cutting line
- The key machinery suppliers are:
- Rieter Perfojet, France
- Fleissner GmbH & Co. (Germany)

### **Quality Standards**

There are no BIS standards for non woven wipes.

## Mosquito Nets

The Mosquito net is an essential item used all over the country for protection from mosquitoes; therefore the market of the item exists throughout the year. As other precautions in practice like Mosquito Repellent Mats, Ointment and coils have various side effects; people prefer the use of Mosquito Nets therefore the demand is increasing day by day.

### ***Product characteristics and Consumption norm***

Nylon net constitutes around 96% of the raw material cost of the mosquito net. The process of manufacture of Nylon Mosquito Net is very simple. A piece of Net cut in rectangle size as per required size. The required rectangle size Net along with Cotton Tape is spread on sewing Machine and stitch from one corner to the end. On an average, around 10 metres or 1.5-2 kg of nylon net is used for manufacturing 1 mosquito net.

### **Market size and trade trends**

The market size estimate for mosquito nets has been arrived through analysis of data on usage of mosquito nets as per the Survey report of NSSO. The industry is very fragmented with many small players. The total estimated market value for mosquito net is estimated to be Rs. 471 Crore. The market has grown by 20% during the last five years.

Exhibit C-182: Market size estimate

	2012-13
Quantity (in Mn. metres)	157
Value (in Rs. Crore)	471

*\*source: IMaCS analysis, industry sources*

### ***Key growth drivers and Inhibitors***

The domestic demand has increased from 90 million metres in 2007-08 to 157 million metres in 2012-13, growing at over 20%. Domestic demand

### ***Key Manufacturers***

Mosquito nets in India are manufactured by small scale and cottage industries. The industry is clustered at Karoor in Tamil Nadu which accounts for production of 170 MT to 180 MT.

### ***Import export scenario***

The import of mosquito nets have increased at 49% from Rs. 7.5 Crore to Rs. 37 Crore while the exports have declined indicating the growing Indian market.

**Exhibit C-183: Import export trends**

<b>HS code family</b>	<b>HS code description</b>	<b>Applicable HS codes</b>	<b>2012-13</b>
<b>Imports</b>			
<b>6304</b>	Mosquito nets of cotton, knitted/crocheted	63049270	Rs. 37 Crore
<b>Exports</b>			
<b>6304</b>	Mosquito nets of cotton, knitted/crocheted	63049270	Rs. 1 Crore

*\*source: IMaCS analysis, DGCIIS*

### **Quality Standards**

The standards for mosquito nets are mentioned under BIS standard – IS 9886:1990 and IS 10054:1996.

## Furniture fabrics & other coated fabrics

Indian Furniture industry can be segmented as Home furniture, Office furniture and Contract furniture (majorly the hospitality segment). Fabrics are mainly used in furniture made for seating purposes. Hair, fibre, flock, foam rubber, down, and kapok are used for padding in modern upholstery whereas woven fabrics, plastics, leather and synthetic leather serve as coverings. Other coated fabrics include fabrics coated with amylase and other chemicals mostly used for book covers or as canvas for paintings and protective coverings.

### *Product Characteristics*

Woven fabrics including flock and velvet are the most widely used furnishing fabrics in furniture. Both plain and printed flock fabrics with an average GSM of 145 are used for the purpose. Jacquard and Shanil have also gained customer preference as these fabrics are dust resistant. Artificial leather is another very widely used material for furniture. The popular characteristics of artificial leather (PVC/PU Coated fabric) are given in the following table:

Particulars	Characteristics
<b>Design</b>	Plain, embossed and printed
<b>Backing</b>	High strength PU/ PVC knitted or dyed
<b>Thickness</b>	0.7 mm to 1.2 mm

Home furniture is the largest segment in the Indian furniture market, accounting for about 65% of the furniture sales. This is followed by the Office furniture segment with a 20% share and the Contract segment with a 15% share. Indigenously manufactured furniture dominates the Indian market with around 62% market share of which upholstered home furniture constitutes 30%. Wooden furniture comprises the largest share (about 65%) of the furniture in India followed by metal furniture with a 25% share and plastic furniture with a 10% share. Furnishing fabric finds application majorly in the wooden furniture segment.

Steady growth in the Indian economy and the consequent rise in living standard has significantly influenced the Indian furniture industry. The key demand drivers for the industry include changing consumer demographics, real estate/housing boom and growth in tourism/hospitality industry. Increased *Market sizing and demand estimation of technical textile products* 416

propensity to spend on lifestyle and consumer products, driven by trends like increase in number of double income families, ease of financing for consumer durables and exposure to global products has also positively impacted the furniture sector. These factors are expected to drive demand for furniture and thus, furniture fabric in the future. Moreover, hotel industry is witnessing an increase in the capacity at a rate of 15% per annum which also augurs well for the industry.

### **Market size and trade trends**

Furnishing fabrics are used in a variety of applications like floor/wall coverings, rugs, furniture, etc. however, furniture accounts for the highest consumption (around 85%) of the furnishing fabric. Indian furniture market is estimated at Rs. 35,000 Crore and is expected to grow at 20% year-on-year over the next five years. The average replacement time of furniture fabric is assumed to be 5 years for the home furniture and 3.5 years for the hotel furniture.

### ***Market size estimate***

The projected market value for furnishing fabrics and other coated fabrics in India is shown for 2012-13. The furniture Industry in India has grown at the rate of 20% during the last five years. Based on this estimate the total market for furniture fabric is estimated to grow in line with the furniture industry, driven primarily by demand of home furniture. The expected market value of furniture fabric and other coated fabrics in 2012-13 is Rs. 3317 Crore worth 206 million metres. However, as input from key manufacturers and user industries is still awaited, the market size depicted is only estimation and would differ based on inputs of key players.

Exhibit C-184: Market size estimate

	2012-13
<b>Quantity (in Mn. metres)</b>	206
<b>Value (in Rs. Crore)</b>	3317

*\*source: IMaCS analysis, industry sources*

### ***Key growth drivers and Inhibitors***

Growing furniture industry of India is the strongest driver for furniture fabrics in India. In the furniture segment the home furniture account for close to 65% of all furniture requirements. It is the main driver for furniture fabric industry. However, in recent years, the import of furniture has picked up and organised retailing of furniture is slowly catching up. As more and more imported furniture come to India, the scope of value addition on the furniture by placing furniture fabrics decline resulting in lower

demand for furniture fabrics in India. The market is expected to grow at 7% per annum during the coming three years.

### **Key Manufacturers**

Key manufacturers of furniture fabrics in India in particular – flock fabrics are – Chiripal group and Flocksur India Ltd. In addition to these major manufacturers for PVC and PU fabrics include Jasch Industries and Mayur Uni coaters Pvt. Ltd.

### **Import export scenario**

India is a major importer and exporter for furniture fabrics. In the last five years, the import of furniture fabric in to India has gone down by 11% while the export has grown by close to 34%.

Exhibit C-185: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>5801</b>	VELVET	58013140	Rs. 375 Crore
	HS code - 07'Warp pile fabrics, épinglé (uncut) of others - 'OTHERS	58013490	
<b>5806</b>	Jute webbing	58063920	
	Other narrow fabrics of jute	58063930	
	Fabrics consisting of warp without weft assembled by means of an adhesive(bolducs)	58064000	
<b>5901</b>	Textile fabrics coated with gum etc used for outer book covers, cotton	59011010	
	Prepared painting canvas (textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like: prepared painting canvas)	59011020	
	Others (textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like: others)	59011090	
	Others (textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like; tracing cloth; prepared painting canvas; buckram and similar stiffened textile fabrics of a kind used for hat foundations: others)	59019090	
<b>5903</b>	Imitation leather cloth of cotton laminated plated etc with PVC	59031010	

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HS code family	HS code description	Applicable HS codes	2012-13
	textile fabrics impregnated, coated, covered or laminated with plastics with PVC - other fabric impregnated, laminated plated and coated with PVC	59031090	
	Imitation leather cloth of cotton laminated plated, coated, etc with polyurethane	59032010	
	textile fabrics impregnated, coated, covered or laminated with plastics with PU - other fabrics impregnated laminated plated and coated with polyurethane	59032090	
<b>5907</b>	Textile fabrics covered with textile flocks on the base fabrics of cotton	59070011	
	textile fabrics covered with textile flocks on base fabrics of man-made textile material	59070012	
	textile fabrics covered with textile flocks on base fabrics of other textile material	59070019	
<b>Exports</b>			
<b>5801</b>	VELVET	58013140	Rs. 522 Crore
	HS code - 07'Warp pile fabrics, épinglé (uncut) of others - 'OTHERS	58013490	
<b>5806</b>	Jute webbing	58063920	
	Other narrow fabrics of jute	58063930	
	Fabrics consisting of warp without weft assembled by means of an adhesive(bolducs)	58064000	
<b>5901</b>	Textile fabrics coated with gum etc used for outer book covers, cotton	59011010	
	Prepared painting canvas (textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like: prepared painting canvas)	59011020	
	Others (textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like: others)	59011090	
<b>5903</b>	Others (textile fabrics coated with gum or amylaceous substances, of a kind used for the outer covers of books or the like; tracing cloth; prepared painting canvas; buckram and similar stiffened textile fabrics of a kind used for hat foundations: others)	59019090	
	Imitation leather cloth of cotton laminated plated etc with PVC	59031010	
	textile fabrics impregnated, coated, covered or laminated with plastics with PVC - other fabric impregnated, laminated	59031090	

HS code family	HS code description	Applicable HS codes	2012-13
	plated and coated with PVC		
	Imitation leather cloth of cotton laminated plated, coated, etc with polyurethane	59032010	
<b>5907</b>	textile fabrics impregnated, coated, covered or laminated with plastics with PU - other fabrics impregnated laminated plated and coated with polyurethane	59032090	
	Textile fabrics covered with textile flocks on the base fabrics of cotton	59070011	
	textile fabrics covered with textile flocks on base fabrics of man-made textile material	59070012	

\*source: IMAcS analysis, DGCIIS

### Machinery details

The machinery required for making of coated fabrics and furniture fabrics includes coating line, mixers, printing machines, embossing machines, etc. Major suppliers of these machines are listed below:

- Isotex, Italy
- Matex Italy
- Web Processing, UK
- Coatema, Germany
- Zimmer, Germany

Suppliers of Coating and Flock printing machines:

- A.T.E. Private. Limited
- A.T.E. Enterprises Private Limited
- Harish Enterprise Pvt. Limited
- Kusters Calico Machinery Limited
- Shreeji Engineering & Marketing Services
- Stovec Industries Limited

### Quality Standards

The upholstery fabric is tested for basic parameters like Tensile Strength, Tear Strength, Elongation and GSM. Some materials undergo tests to check their stain resistance and flame resistance. In many cases Weatherometer is also used to check the UV degradation due to sunlight and ageing.

## 9. Protech

Protective technical textiles are speciality textiles that provide protection to the person wearing in hazardous situations like fire, chemical exposure, protection from bullets and explosions and extreme temperatures and other extreme atmospheric conditions.

### List of Products

The major products under the segment have been listed as under:

- Bullet Proof Jackets
- Fire retardant Apparels
- Fire retardant Fabrics
- Nuclear and Biological Suits
- Chemical Protective Clothing
- High visibility clothing
- Industrial gloves
- High Altitude Clothing
- Other Protective clothing – Wind cheater and rain coats

### Market size and trends

The total estimated market size of Protech is estimated to be Rs. 1,340 Crore including export potential. The entire market is catered mostly by domestic production with imports limited to just 1%. The product wise market size has been shown in the exhibit below.

Exhibit C-186: Market size estimation

Product	2012-13 (All figures in Rs. Crore)				Market size
	Production	Import	Export	Domestic Consumption	
Personal Protective Jackets – Bullet proof Jackets <sup>§</sup>	185	1	54	132	186
FR apparels	156	0.66	57	100	157
FR fabrics	223	0	0	223	223
NBC suits	9.3	0	0	9.3	9.3
Chemical Protective Clothing	16.8	4	0	20.8	20.8
High visibility clothing	75	0	0	75	75

Product	2012-13 (All figures in Rs. Crore)				Market size
	Production	Import	Export	Domestic Consumption	
Industrial gloves components*	178		151.5	26.5	178
High altitude clothing	389	0	0	389	389
Outer Protective clothing#	101	1.2	0.3	102	102

Source: IMAcS Analysis

Market size is calculated as Domestic market + Exports

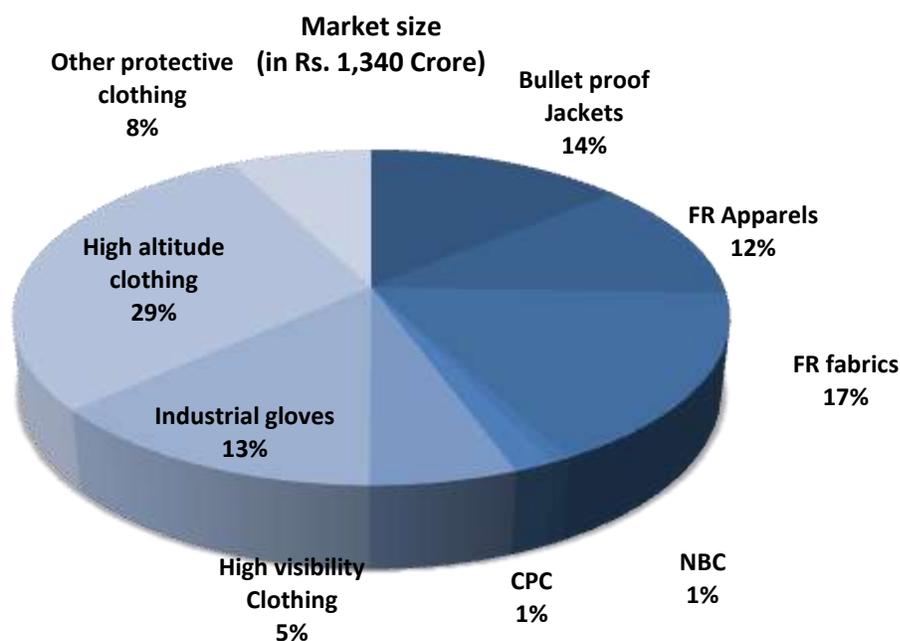
\*Market of Industrial glove components as been estimated as 15% of total industrial glove exports. Import of gloves is Rs. 7 Crore.

#estimated market is based on 20% of total raincoat and windcheater exports

\$ Does not include supply from Ordinance factory

High altitude clothing, industrial gloves and fire retardant apparels and fabrics are the biggest component of the segment. Other key segments are outer protective clothing and high visibility clothing. Product segment wise market share has been shown in the exhibit below.

Exhibit C-187: Market size pie product wise



Source: IMAcS Analysis

### Key players of the industry

The key players of the segment have been listed as under:

- Ordinance factories

- Tata Advanced Materials Ltd.
- S M Group
- MKU Pvt. Ltd
- Shri Lakshmi Cotsyn Defence
- Tencate India Ltd.
- Rajasthan Spinning and Weaving Mills
- JCT Ltd
- Entremonde Polycoaters
- Kusumgar Corporates
- Tara Lohia Pvt. Ltd.
- Mallcom India Ltd.
- Rajda Exports
- Reflectosafe Ltd.

The detailed analysis of each product has been done in the subsequent sections.

## Bullet Proof Protective Jackets - BPF

Personal protective clothing is comprised of the bullet proof vests and executive body armours. This is one of the oldest industries the world has known. However, it was only during the World wars that extensive research was done in this field and the traditional body armour comprising of steel plates was replaced by ballistic nylon in 1940s. It stayed in fashion for the next 30 years, till 1965, when Stephaine Kwolek a scientist working with Du pont, succeeded in producing the polymer **Poly Para Phenylene Terapthamide** through polymerisation. In today's world it is commonly known as Kevlar and is the base fibre for most of the body armour being woven today. In addition to Kevlar, today non-woven Spectra shields are also being used as body armour.

### *Product Characteristics*

The bullet-proof jackets are made from Aramid, Nylon 66, UHMPE, Carbon fibres or PBO. Each jacket weighs about 5 kilograms and is expected to have the following properties:

1. Light weight
2. Comfortable to wear
3. Facilitate body movement
4. Ability to spread the projectile energy efficiently

Each jacket has about 0.6 square metres of non-woven material weighing around 750 GSM. Bulk of the jacket is made from woven material as the combination of weave and the fibre characteristics influence the energy absorption characteristics of bullet-proof jacket. The synthetic fibre (Aramid) used in production of bullet-proof jackets is primarily imported (DSM Netherlands/DuPont etc) with the exception of carbon glass fibre. The average life of a bullet proof jacket is about 7 years.

### Market size and trade trends

With the rising trend of crime, violence and terrorism, the demand for bullet-proof jackets is rising as well. The major customers of bullet-proof jackets are Defence, Paramilitary forces engaged in counter terrorism/insurgency operations and Law enforcement agencies (police). Despite high demand, there are only a few suppliers in the market. Most of the purchase of bullet proof jackets is done via tenders floated by Ministry of Home affairs – for police and paramilitary requirement, Ministry of Defence – for requirements of Indian armed forces and by respective states in small lots. A major chunk of the demand from armed forces is catered by the Ordinance equipment factories. Last three years has seen an upsurge in demand of Bullet proof jackets from various government organisations especially with

tenders of big value being floated. In 2009-10, MoHA floated a tender for procurement of 59,000 bullet proof jackets. This was the first tender of such a big value. Recently in 2011-12, Ministry of Defence has floated a similar tender for procurement of 1.86 lakh jackets the largest procurement tender ever to come out in India. In addition to these, every State floats its own tender for procurement of BP jackets; however these are of relatively smaller quantity ranging from 500 to 1000 jackets at a time. Besides this there is also retail demand for BP jackets. Close to 90% of the tenders are for procurement of BP jackets of quality standard III A, which is sufficient for protection against A K 47 bullets.

### **Market size estimate**

The total domestic market for Bullet proof jackets in India is estimated to be Rs. 131 Crore excluding the supply from Ordinance factories. In addition India also does exports to the tune of Rs. 54 Crore.

Exhibit C-188: Market size estimate

	2012-13
Quantity (in Nos.)	72,400
Value (in Rs. Crore)	186

\*source: IMAcS analysis, industry sources

### **Key growth drivers and Inhibitors**

Key growth drivers for market of bullet proof jackets are:

- **Increasing terror threat:** With the increasing terror threat, the requirement for bullet proof vests and jackets for VIPs and VVIPs have increased in goods numbers. In Addition, to that, the use of bullet proof jackets in non-active field areas by the security forces has also increased, leading to the growth in market for Personal protective jackets.
- **Demand from security forces:** Indian Army, Reserve services and Police services have a very high demand for bullet proof jackets. Given the size of Indian Army, it is mandated that Indian Army should have close to 3.5 lakh bullet proof jackets at a time, however, Indian armed forces currently has just around 1.5 lakh jackets. With an attempt to bridge this gap, the Government is going for large scale purchases of bullet proof jackets which is driving the market forward.. As a result the overall requirement of personal protective jackets in the security forces has increased.

With increased focus on protective jackets, the market is expected to grow at 12% per annum during the next three years.

### Key Manufacturers

Other than ordinance factories, Bullet proof jackets are manufactured by select other industry players. The major manufacturers are

- Tata Advanced materials Ltd (TAML)
- MKU Pvt. Ltd
- SM Fabric Pvt. Ltd.

### Import export scenario

India is a net exporter of bullet proof jackets. The total export of bullet proof jackets in 2012-13 was of 34,000 units valued at Rs. 57 Crore. Exports have grown rapidly from Rs. 4.2 Crore in 2007-08 Imports on the other hand was insignificant at just Rs. 65 lakh.

Exhibit C-189: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>6210</b>	Personal protective garments (e.g. bullet proof jackets, bomb disposal jackets etc)	62104010	Rs. 0.65 Crore
<b>Exports</b>			
<b>6210</b>	Personal protective garments (e.g. bullet proof jackets, bomb disposal jackets etc)	62104010	Rs. 57 Crore

\*source: IMAcS analysis, DGCI

### Quality Standards

The Quality standards and testing for bullet proof vests is done at the Terminal Ballistic Research Lab (TBRL) of DRDO in India since 1970s. It follows U.S National Institute of Justice (NIJ) Standard 0101.06 for evaluation of bullet proof jackets. However TBRL does not certify any bullet proof vests. To test the bullet proof jackets in addition to the perforation resistance testing, Perforation and Back Face signature (P-BFS) test is performed. In this test, the measure of the energy delivered to the tissue by a non-perforating projectile is taken to identify the amount of injury and trauma that it would cause to the weaver. Based on the standard bullet proof vests can be classified into five types enumerated in the exhibit below:

Exhibit C-190: Quality standards for Bullet proof jackets

S.No	Type of Armour	Ammunition used for testing	Ammunition weight for testing	Ammunition velocity for testing
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<b>S.No</b>	<b>Type of Armour</b>	<b>Ammunition used for testing</b>	<b>Ammunition weight for testing</b>	<b>Ammunition velocity for testing</b>
<b>1.</b>	Armour Type IIA	9mm full metal jacket rounded	8gm	373 m/ s + - 9.1 m/s
		.40 S&W full metal jacket bullet	11.7 gm	352 m/ s +- 9.1 m/s
<b>2.</b>	Armour Type II	9mm full metal jacket rounded	8gm	398 m/ s + - 9.1 m/s
		.357 Magnesium jacketed soft point bullet	10.2 gm	436 m/s+- 9.1 m/s
<b>3.</b>	Armour Type IIIA	.357 SIG full metal Jacket flat nose bullet	8.1 gm	448 m/ s +-9.1 m/s
		.44 Magnesium semi jacketed hollow point bullet	15.6 gm	436 m/s+-9.1 m/s
<b>4.</b>	Armour Type III	7.62 mm full metal Jacket steel Jacketed bullet	9.6 gm	847 m/ s +-9.1 m/s
<b>5.</b>	Armour Type IV	0.3 caliber armour piercing bullet	10.8 gm	878 m/ s +-9.1 m/s

## Fire retardant Apparels

The fire/flame retardant apparels have an industrial need as they offer protection from fire and other heat intensive tasks. Flame, heat and splashes of molten metal etc. are hazards in many heavy engineering working conditions. The fire retardant apparels are used in refineries, iron and steel plants, aluminium plants and welding industries.

### *Product Characteristics:*

The typical characteristics of fire retardant (FR) apparel are:

1. Flame resistance – must not catch fire
2. Should be breathable
3. Easy to wear
4. Light weight
5. Should have high abrasion resistance

FR Apparel can be developed in two ways:

1. **Chemical coating of cotton fabric with FR chemical.** The chemical generally used for coated fire retardant fabric is PYROVATEX® from CIBA. The apparel made from coated fabric generally has a basis weight of 250-350 GSM. The fabric used could be either woven or knitted. The coated fabric which accepted worldwide could have flaws due to incomplete coverage of fire retardant chemical on the fabric surface which would pose threat with aging.
2. **Apparel made from inherent FR fibre:** FR fibres are fibres having the technical properties, where in the molecules swells when in presence of heat, providing the person, longer protection from fire. The advantage of apparels made from FR fibres, is that the resistance to fire does not degrade after washing. Following are a few fibre retardant fibres used of this production of apparel:

**Exhibit C-191: Fibres having fire resistant properties**

Generic name	Fibre	Manufacturer
<b>Aramid (Meta)</b>	Nomex	DuPont
<b>Aramid (Para)</b>	Kermel/Kevlar/Twaron	Rhone-Poulence/ DuPont/ Akzo (Holland)
<b>Mod-acrylic</b>	SEF/ Kanecaron	Monsanto (Italy)/ Kaneka (Japan)
<b>Polyamide</b>	P84	Lenzing (Austria)

Generic name	Fibre	Manufacturer
Vinal	Vinex FR9B	Westex

Source: Industry sources

### **Market size and trade trends**

The market of fire retardant apparels is primarily driven by increased awareness, international level of safety standard in industrial workplace and mandatory safety norms for protection of workers. The fire retardant apparels are generally used in industries where operations have to be done in high temperature zones or industries where highly inflammable products are being handled. The key industries requiring FR apparels are:

1. Iron and Steel industry for use in Blast furnace.
2. Welding industry
3. Oil Refineries and Oil drilling stations.

In addition to these, defence establishments and fire department also procures FR apparels.

### ***Market size estimate***

The market size for FR apparels has been estimated using the inputs from the supply side. Mallcom India Ltd, Tara Lohia and Chandramukhi Impex are the leading manufacturers of FR apparels in India. The estimated total market size of FR apparels in India is of 15 lakh pieces valued at Rs. 157 Crore in 2012-13. While domestic market has grown at a moderate pace, the potential and market for exports have grown tremendously to Rs. 57 Crore.

Exhibit C-192: Market size estimate

	2012-13
Quantity (in Nos.)	15 Lakh
Value (in Rs. Crore)	Rs. 157 Crore

\*source: IMaCS analysis, industry sources

### ***Key growth drivers and Inhibitors***

Currently the market is being driven by the growing demand for export, which has grown by leaps and bounds. The domestic market is driven by the usage in oil and gas industry and chemical industry. The overall market is expected to grow at 12% per annum during the coming three years.

### Key Manufacturers

Major manufacturers of FR apparel in India are Mallcom India Limited, Tara Lohia Pvt. Limited and Chandramukhi Impex.

### Import export scenario

While imports of FR apparels are insignificant, export of FR apparels has grown tremendously from Rs. 4.4 Crore in 2007-08 to Rs. 57 Crore in 2012-13. The HS codes under which exports were made can be seen as under.

Exhibit C-193: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>6210</b>	Garments made up of non woven fabric or felts that are coated, laminated or impregnated	62101000	Rs. 0.66 Crore
	Articles of apparel and clothing accessories, not knitted or crocheted // Garments, made up of fabrics suitable for Industrial use or of non woven or felt and wades -other personal protective garments	62104090	
<b>Exports</b>			
<b>6210</b>	Garments made up of non woven fabric or felts that are coated, laminated or impregnated	62101000	Rs. 57 Crore
	Articles of apparel and clothing accessories, not knitted or crocheted // Garments, made up of fabrics suitable for Industrial use or of non woven or felt and wades -other personal protective garments	62104010	

\*source: IMAcS analysis, DGCIS

### **Quality Standards**

Fire retardant apparels are covered under BIS: IS: 13501:1992 and IS: 11871:1986 and IS: 12777:1989. In addition to these following standards under BIS are applicable on fire retardant fabrics:

- IS 12467: 2005
- IS 15589:2005
- IS 15590:2005
- IS 15612:2005
- IS 15727:2005
- IS 15741:2007
- IS 15748:2007
- IS 15758:2007
- IS 15764:2007 & 2008
- IS 15768:2007
- IS 15781:2007
- IS15782:2007

The companies in India also follow the European Standard like EN 512 based on the level of protection need to be offered to the person wearing the apparel

## Fire retardant Fabrics

Fire retardant fabrics are either synthetic fabric made of fibres that have inherent fire retardant properties or fabrics having a coating of fire resistant chemicals. These fabrics have properties that delay the spread of fire or provide insulation against heat and flame thereby providing crucial extra time to the person using it.

### Fabrics with Fire resistant coatings

Fire retardant clothing and fabrics saw its beginning in early 1700s when Obadiah Wyld of the then Great Britain developed first fire retardant coating for fabrics. However, the development of fire retardant fabrics took momentum only after 1912 when William Perkins using Stannic oxide developed a fire retardant coating that could withstand up to two years of washing. Based on his research the chemical Tetra (Hydroxymethyl) Phosphonium Chloride (THPC) was developed in 1953 for commercial use as flame retardant coating. Further research led to identification of PNBs which are currently used as fire retardant coating chemicals. These chemical delay the spread of fire in the following ways:

1. Promotion of char formation
2. Conversion of volatile gases into non-ignitable gases through chemical reaction in presence of heat.
3. Forming a glaze on the surface of the fabric
4. Free radical termination in the gaseous phase

### Fabrics with inherent fire resistant properties:

Fabrics with inherent fire retardant properties are the ones that are made up of fibres that resist combustion. Although it is a misnomer to call them fire retardant, but they take a longer time to catch fire and hence help in applications where fire retardant is required. These fibres in particular aramids, swell when due to heat providing a cushion to the wearer.

Common types of inherent fire retardant fabrics used are:

Generic name	Fibre	Manufacturer
<b>Aramid (Meta)</b>	Nomex	DuPont
<b>Aramid (Para)</b>	Kermel/Kevlar/Twaron	Rhone-Poulence/ DuPont/ Akzo (Holland)

Generic name	Fibre	Manufacturer
<b>Modacrylic</b>	SEF/ Kanecaron	Monsanto (Italy)/ Kaneka (Japan)
<b>Polyamide</b>	P84	Lenzing (Austria)
<b>Vinal</b>	Vinex FR9B	Westex

### **Market size and trade trends**

The market for FR fabrics in India is driven by institutional demand from Railways and Airways. It is estimated that railways has a requirement of around 10 to 15 lakh metres of Railways. However the market for FR fabric for usage in seat covers of airlines has declined recently as many airlines are now purchasing furnished air craft's. In addition to the above mentioned requirement, demand of FR fabric for use in auditoriums, multiplexes and commercial places is also growing at a slow rate.

### ***Market size estimate***

The market size estimate for the market of FR fabrics has been estimated using the supply side inputs. The total market size of FR fabric in India for 2012 – 13 is estimated to be of 63 lakh metres valued at Rs. 223 Crore.

**Exhibit C-194: Market size estimate**

	2012-13
<b>Quantity (in metres.)</b>	53 Lakh
<b>Value (in Rs. Crore)</b>	Rs. 223 Crore

*\*source: IMAcS analysis, industry sources*

The market has grown at 5% mostly due to inflationary price change. The overall market in volume terms has seen a very trivial change in the last five years.

### ***Key growth drivers and Inhibitors***

- The key industries which drive the off-take of fire retardant fabric are given below:
- All building and constructions need to get fire safety clearance from the fire department. However these clearances are more from the construction perspective rather than furnishing perspective. With boom in retail and real estate there has been rapid emergence of shopping complex, malls, cinema multiplex etc. There is need of fire retardant fabrics in these areas from the security point of view.
- Airlines, Railways and Ships are another key market

- Office furnishings and hospitals and another key sector

The fabrics find application in curtains, sheers, upholstery, stage curtains, blankets, bedding, wall coverings and blinds. However the awareness of these materials is low and there is no regulation on usage of these materials from the safety perspective which hinders the market off-take. As a result the market of institutional and office building is still largely un-tapped with very low penetration. The market is expected to grow at 4% per annum during the coming three years.

### ***Key Manufacturers***

Key manufacturers of FR fabrics in India are:

- Arvind Mills
- JCT Ltd.
- RSWM Ltd.
- JayaShree Textiles
- Delkon India Pvt. Ltd.

### ***Import export scenario***

International trade of fire retardant fabrics is insignificant, However, the key chemical used for making coated FR fabrics – Pyrovatex is mostly imported into India.

### **Quality Standards**

Fire retardant furnishing fabrics are covered under BIS: IS: 13501:1992 and IS: 11871:1986 and IS: 12777:1989. In addition to these following standards under BIS are applicable on fire retardant fabrics:

- |                  |                        |
|------------------|------------------------|
| • IS 12467: 2005 | • IS 15748:2007        |
| • IS 15589:2005  | • IS 15758:2007        |
| • IS 15590:2005  | • IS 15764:2007 & 2008 |
| • IS 15612:2005  | • IS 15768:2007        |
| • IS 15727:2005  | • IS 15781:2007        |
| • IS 15741:2007  | • IS15782:2007         |

In addition to these, major manufacturer of FR fabrics also adhere to British and other European standards.

## NBC suits

Hazardous material (Hazmat) suits were designed to protect users handling hazardous waste material such chemicals, radioactive material etc. A more specialized variety of these suits are NBC (Nuclear Biological and Chemical) suits. Developed to protect soldiers, these are designed to protect the user in a hostile environment with chemical/biological agents and against radioactive fallout dust. The suits are designed to be worn for extended periods while continuing to operate in a combat environment.

### *Product Characteristics*

The NBC suit consists of a trouser and jacket and can be used directly over the under garments. The suit is permeable and allows evaporation of sweat (breathable). The suits are made in different sizes, generally these sizes are: small, medium, large and extra-large.

The suit is made of three layers:

1. Inner layer: Fabric cotton
2. Middle layer: Active charcoal treated non-woven
3. Outer layer: Fabric with chemical and fire retardant fibres (inherently retardant). The outer fabric has disruptive printing to camouflage the soldiers and the base material for this coated fabric is polyester

The physical characteristics of the NBC suit are given below:

1. Fire/Heat/Cold/Water repellent outer fabric
2. Breathable
3. Effective in the temperature range of -35°C to +55°C
4. Resistance to wear and tear – high abrasion resistance
5. Can be decontaminated at least two times
6. Washable

The major manufacturing of NBC suits in India is done by Ordinance factory. DRDE, Gwalior has been involved in research and development of NBC suits in India. Currently India manufactures **NBC suit category MK IV**. The salient features of the same are:

- Weight of up to 3 kg
- Biological protection of up to 24 hours
- Life of three wash cycles
- Shelf life of five to seven years

DRDE is currently involved in development of advanced version of this suit **NBC suit MK V**. The new product would be very similar to the German counterpart - CBRN suits which is currently being imported in India. The salient features of the same are:

- Weight of less than 2.5 kg
- Biological protection of more than 24 hours
- Life of up to six wash cycles

The product is expected to be in production in by 2014.

### **Market size and trade trends**

Total of 41145 NBC MK IV suits has been produced by Ordinance factory till date costing a total of Rs. 41.9 Crore. At an average life of five years, the market for indigenous production of ordinance factory is estimated at Rs.8.4 Crore. There has been no import of NBC suits in 2012-13. With the development of new NBC MK V suits, Indian Army has already put up request for 40,000 new suits, which would be priced at Rs. 25,000. Hence in the coming two years, the market is expected to reach Rs. 14 Crore as MK IV suits would be replaced by MK V suits.

### ***Market size estimate***

The estimated market for NBC suits in India is shown in the exhibit below:

Exhibit C-195: Market size estimate

	2012-13
Quantity (in Nos.)	9143
Value (in Rs. Crore)	Rs. 9.3 Crore

*\*source: IMAcS analysis, industry sources*

### ***Key growth drivers and Inhibitors***

With the increase in biological and nuclear threats, Indian Armed forces are gearing up for better protection. As armed forces are the major buyer of NBC suits, the usage norm and requirement of Armed forces is expected to drive the market in the coming years. With Army gearing up to purchase new MK V suits once they are in production, the market is set to rise in the coming years. However, the growth in market would be sporadic and for the next three years it is expected to be around 12% per annum.

### ***Key Manufacturers***

Ordinance Factory is the key manufacturer of NBC suits. However lately private organisations like Entremonde Polycoaters and Sri Lakshmi Cotsyn Defence have also started production of NBC suits in

India. Companies like Entremonde Polycoaters and Kusmgar are involved in developing breathable fabrics and other fabrics for NBC suits.

***Import export scenario***

Advanced NBC suits are generally imported from Germany. Those are called CBRN suits. While 2012-13 had no international trade for NBC suits, they were last imported in 2010-11 from Germany to tune of Rs. 1.5 lakh.

**Quality Standards**

The quality standard for NBC suits is set by DRDE Gwalior who is the main researching body for development of NBC suits in India.

## Chemical Protective Clothing (CPC)

Chemical Protective Clothing (CPC) is used for protection from chemical and physical hazards. The chemicals get absorbed into the human body by two ways:

- Physical contact-The chemicals gets absorbed through the skin
- Inhalation: The chemicals in gaseous state get absorbed in to the body through breathing.

Chemical protective clothing is used for protection of the whole body against toxic chemicals which manifest their effect by absorption through skin.

### *Product Characteristics*

The CPC suits can be classified into two categories:

- Durable:** The durable Chemical protective clothing is made of non-permeable textile fabrics (PVC/Rubber coated fabrics).The protection is achieved by blocking the penetration and permeation of the chemicals through the fabrics in the clothing. This is an effective method for providing sufficient protection to professionals from contact of toxic chemicals. These fabrics do not allow air or moisture permeability which leads to stress and drop in productivity.
- Disposable:** The disposable CPC is made of non woven fabric and can be used for 3-4 times .The disposable CPC provide better air and moisture permeability. Permeable type of clothing is preferred over impermeable type due to low heat stress and comfort, enabling use for a longer duration. The carbon-containing material developed so far includes carbon-coated non-woven fabric, carbon-impregnated polyurethane foam, hard carbon microsphere-adhered woven fabric and activated charcoal cloth.

The non woven fabrics are also used as overalls in various industries and the demand of such products is picking up. The CPC clothing includes gas masks, hoods etc to prevent against airborne toxic agents.

### Market size and trade trends

The demand for CPC in India is almost entirely of the durable type. Typically PVC coated fabrics are used. The base fabric is made up of cotton or a mix of polyester cotton. The demand of CPC is from Chemicals and Chemical Products, Paints, Dyestuff, Petroleum industries etc. These suits are required by the workers engaged in the chemical handling section. The demand from Chemicals and Chemical Products industry accounts for 70 % of the total demand of the chemical protection suits. In addition to that anti grease CPC are used in Oil and Petroleum industry. These suits are coated with neoprene rubber as other coated fabrics are not suitable. The other fabrics swell after repeated exposure to oil. The key

demand drivers are the growth of chemical and chemical product industry and increasing awareness of occupational health and safety issues

### **Market size estimate**

The total market potential for CPC in India has been shown in the exhibit below.

Exhibit C-196: Market size estimate

	2012-13
<b>Quantity (in Lakh nos.)</b>	1.04
<b>Value (in Rs. Crore)</b>	20.82

\*source: IMAcS analysis, industry sources

\*Inputs from key players are awaited

### **Key growth drivers and Inhibitors**

As Chemical Industry of India is the major consumer of CPC followed by Petroleum Industry, the growth of these industries would be a major driving force for CPC industry in India. Along with this, formation of norms and regulations for usage of CPC in hazardous working environment would give a boost to the industry. The market is expected to grow at 10% per annum.

### **Key Manufacturers**

Key manufacturer of CPC in India are:

- Sai Synergy Ltd.
- Intech Safety Pvt. Ltd

### **Import export scenario**

India has been importing CPC since 2011-12. The estimated import of CPC is Rs. 4.4 Crore.

Exhibit C-197: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>6210</b>	Garments made up of non woven fabric or felts that are coated, laminated or impregnated	62101000	Rs. 4.4 Crore
	Articles of apparel and clothing accessories, not knitted or crocheted // Garments, made up of fabrics suitable for Industrial use or of non woven or felt and wades -other personal protective garments	62104090	

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HS code family	HS code description	Applicable HS codes	2012-13
<b>Exports</b>			
<b>6210</b>	Garments made up of non woven fabric or felts that are coated, laminated or impregnated	62101000	
	Articles of apparel and clothing accessories, not knitted or crocheted // Garments, made up of fabrics suitable for Industrial use or of non woven or felt and wades -other personal protective garments	62104010	-

\*source: IMAcS analysis, DGCIIS

### Quality Standards

BIS specifies the CPC clothing parameters in under the codes of IS 5071: 2002 and IS 15758: 2007.

## High Visibility Clothing

High visibility clothes (also known as Reflective-wear) have become very essential for the protection of people working in poorly lit environments like mines, highways, airport runways, cyclist etc. In the dark, the high visibility clothing increases the ability to spot working and guiding personnel

### *Product Characteristics*

There are broadly three types of high visibility clothing:

- Reflection materials which shine when struck by light
- Photo luminescent material which give yellow light in dark
- Fluorescent material which is more visible even during the day

Photo luminescent materials absorb the artificial light and emit green-yellow light in the darkness. Zinc Sulphide crystals which are not radioactive and non toxic pigments. Fluorescent materials convert energy from non-visible UV rays into visible. These are useful during daylight but offer little protection in the dark as they do not emit or reflect light.

The high visibility clothing is available in two classes:

- Suits with plastic tapes
- Suits with glass beads – or retro-reflective tapes – these give visibility up to 600 meters. Retro-reflective tapes are based on the principle that if the incident rays of light fall on concave glass, the reflected rays travel back in the same direction. This enhances the visibility of the person wearing garments consisting of retro reflective tapes. The technology involves coating of highly reflective glass beads with density as much as 50,000 tiny glass beads per square inch light.

Ideal high visibility apparel should have the following characteristics

- Light weight
- Both day and night visibility.
- Air and moisture permeability to ensure wearer comfort (Breathing perforated cloth mesh allows air and moisture through, enabling the vest to be worn over clothing in any weather.)
- Universal one-size-fits-all design features so that jackets/Vests can be shared by the employees working n different shifts.
- Hemmed edges for durability and neatness

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- Hemmed edges for durability and neatness

### **Market size and trade trends**

The key driver for high reflective clothing is the requirement of personnel visibility in ill-light areas of work both from service delivery and safety perspectives. The awareness of these products is low however is growing gradually with usage is airport, police, municipality, mining construction etc. The market in India is nascent and almost all the products are imported and marketed in India.

### ***Market size estimate***

The market of High visibility has been estimated through supply side mapping. Reflectosafe is the largest player in the Industry having about 40% market share, with a production of 2.35 million vests per annum. The total market for high visibility clothing is estimated to be Rs. 75 Crore.

Exhibit C-198: Market size estimate

	2012-13
Quantity (in Lakh nos.)	58.5
Value (in Rs. Crore)	75

\*source: IMAcS analysis, industry sources

### ***Key growth drivers and Inhibitors***

The growing use in construction companies and traffic police clothing is helping the market grow. The use of reflective vest however is not controlled by any government guidelines, which has prevented strong enforcement of use of high visibility clothing. The market is expected to grow as the employment in construction and infrastructure development industry increases. The market has been growing moderately and is expected to grow at 6% during the next three years.

### ***Key Manufacturers***

The high visibility clothing manufacturers source the clothing and tape and fabricate the jacket/vest. There are no manufacturers of these fabrics in India and these are sourced from Korea and China.

Some of the key suppliers of high visibility clothing are given below:

- Reflectosafe, Mumbai
- Intech Safety Private Limited, Kolkata
- Safety Solution Inc., Bangalore
- Delkon Textiles Pvt. Ltd., Faridabad

Delkon manufactures woven base fabric of safety jackets (as per EN 471) and then fabricates safety jackets. They have supplied them to Govt. Organisations in the past. The retro-reflective tape used during fabrication is usually imported. They have a capacity to manufacture and fabricate 3 lakh safety jackets as per EN 471 per year.

### ***Import export scenario***

Import and export of high visibility clothing from India has been insignificant.

### **Quality Standards**

There are no set quality standards for high visibility clothing

## Industrial gloves components

Industrial hand gloves are a part of personal protective equipments, serving as an item of protective apparel for workers in factories. They are classified under Cut-Slash Protection as well as Thermal Protection. Gloves are best for protection from rough objects, sparks and heat, and for cushioning from blows in heavy-duty work requirements. Hand gloves come in different sizes of 14 inches, 16 inches and 18 inches. The different types of industrial gloves and their respective usage have been mentioned as under:

Exhibit C-199: Types of industrial gloves

S.No	Type of glove	Benefits	Applications
1.	Nitrile Gloves	Resistance to cut, puncture and snag	For Dry grip
2	PVC impregnated textile gloves	High abrasion resistance	For Dry, wet and oily grip
3	Leather gloves with Kevlar or p-aramid layer	High temperature and abrasion resistance	For use in high temperature applications and for handling sharp equipments
4.	Rubber gloves (Not a technical textile)	High electrical resistance	Used in applications where electrical equipments and wirings need to be handled and for surgeries and medical applications

The typical characteristics in industrial gloves are as given below:

1. Mild heat resistance
2. High abrasion protection
3. Better grip with anti slip coating
4. Comfortable and durable
5. Protection against cut and hot splash
6. For gloves made from Aramid (para) –temperature tolerance ranges from 250 to 750 Centigrade

Industrial gloves are usually made of three base fabrics - cotton, nylon or polyester. Each of these are used specific to the operation condition and the coating of either Nitrile, or PVC is impregnated as required. Besides, these, some gloves meant for specific industrial use may also have addition layer of special fabrics like Kevlar, nomex, spectra or p-aramid to provide better temperature resistance, fire resistance, cut resistance, etc.

### **Market size and trade trends**

India is a major exporter of Industrial gloves to the world. More than 85% of the production of industrial gloves is exported. In the domestic market industrial gloves are used in applications where cut and temperature protection needs to be present. However, due to lack of any enforcing agency or guidelines, the use of industrial gloves is limited to a few hazardous industries only.

### ***Market size estimate***

Based on the export of industrial gloves from India, the total production of gloves in India and hence the market size has been estimated. Industrial gloves market in India is estimated to be Rs. 1188 Crore, with exports accounting for Rs. 1010 Crore. The technical textile component in the industrial gloves is limited to just 15%. Hence total market of technical textile component in industrial gloves is Rs. 178 Crore.

Exhibit C-200: Market size estimate

	2012-13	
	Industrial gloves	T. T component
Quantity (in mn. pairs)	158	
Value (in Rs. Crore)	1188	178

*\*source: IMAcS analysis, industry sources*

The domestic market has grown by 31% y-o-y while exports have shown exponential growth.

### ***Key growth drivers and Inhibitors***

- The market of work gloves or industrial gloves is primarily driven by increased awareness, international level of safety standard in industrial workplace and mandatory safety norms for protection of workforce. Some of the key end-use applications are:
- Iron and steel industry, where some of the big steel producers such as TISCO, SAIL, Ispat Industries and Essar Steel have been investing further.
- Welding applications
- Oil Refineries
- Construction
- Pharmaceuticals and Chemical Industries

The awareness and usage level of these gloves in the Indian industry is limited compared to International worker safety standards. Majority of the Indian production gets exported with little demand from domestic market. Both the export market of industrial gloves and domestic markets

have shown tremendous growth and are expected to grow moderately in coming years. The segment is expected to grow at 15% during the next three years.

### **Key Manufacturers**

Key manufacturers of industrial gloves in India are:

- Mallcom India Ltd.
- Rajda exports
- Lumen India

### **Import export scenario**

India is a leading exporter of gloves with glove exports of Rs. 1010 Crore in 2012-13.

Exhibit C-201: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13	
<b>Imports</b>				
<b>4015</b>	Industrial gloves	40159030	Industrial glove import Rs. 7.6 Crore	-
<b>4203</b>	Gloves for use in industry	42032910		
<b>6116</b>	Gloves mittens and mitts impregnated coated/ covered with plastic/rubber, knitted/crocheted	61161000		
<b>Exports</b>				
<b>4015</b>	Industrial gloves	40159030	Industrial glove export Rs. 1010 Crore	Value of TT component Rs. 151 Crore
<b>4203</b>	Gloves for use in industry	42032910		
<b>6116</b>	Gloves mittens and mitts impregnated coated/ covered with plastic/rubber, knitted/crocheted	61161000		

\*source: IMaCS analysis, DGCIS

### **Quality Standards**

The companies in India follow the EN or the European Standard like EN 512 based on the level of protection need to be offered to the person wearing the gloves

## High Altitude Clothing

High altitude clothing are used for protection against extreme weather conditions like extremely low temperature, high velocity winds, snow fall etc. especially in critical combat areas which are on average 12000 ft above sea level like Siachen. The clothing at high altitudes needs to meet both functional and comfort properties.

### *Product characteristics*

The high altitude clothing consists of jacket and windcheater, waist coat, trousers, glacier cap, rappelling gloves and glacier gloves. The gear typically weight of special clothing is around nine to ten kilograms.

The typical characteristics of high altitude clothing are:

1. Hydrophilic - Waterproof and moisture resistant
2. It has a breathable membrane of Poly Utherane
3. Abrasion resistance
4. Maintain high integrity

The material used for these clothing is typically hydrophilic polyurethane coating or PTFE coating, Gore-Tex coating or Sympatex coating. The hydrophilic properties are introduced by these coatings or laminates. Micro-porous coatings or laminates can be produced by mechanical fibrillation, phase separation, solvent extraction or solvent exchange. The inner jacket is usually made of fleece and rest of the items are 100% polyester. The general specification of products is:

- Jackets are usually about 2.4 kg in weight and are made of fleece and polyester, having waterproof coatings and a thermal vest.
- Trousers are usually 1.2 kg in weight again made of 100% polyester

### Market size and trade trends

The major market for high altitude clothing is from the defence services, in particular Indian Army. In addition to the defence, High altitude clothing is also required by high altitude mountain climbers. However, this is a very small part of the entire market. Currently Indian Army has 1.325 million soldiers in active field area. Assuming that 20% of these would require high altitude clothing, the estimated demand for high altitude clothing is roughly 2.65 lakh.

Currently Ordnance factories are the major producer of HAL clothing producing 2.5 lakh ECWCS jackets and close to 4 lakh Extreme Weather Clothing (EWCS) trousers. Other than Ordnance factories few specialised private players like Shri Lakshmi Cotsyn Defence have also started production of HAL clothing. However, these are still in pilot phase.

### **Market size estimate**

The estimated market for high altitude clothing in India is about 5.26 lakh High altitude trousers, coats and coat trouser sets amounting to Rs. 389 Crore.

Exhibit C-202: Market size estimate

	2012-13
Quantity (in Lakh nos.)	5.26
Value (in Rs. Crore)	389

\*source: IMAcS analysis, industry sources

### **Key growth drivers and Inhibitors**

The key growth driver for high altitude clothing is the Indian Army and its consumption trends. In the last five seven years, the quality standards of the clothing being supplied to the Indian Army personnel has improved a lot. More sets are being provided with higher quality. Based on this trend the market is dependent on how the scale of clothing of high altitude operations would vary. In addition to that, the continuously increasing size of the Armed forces, is expected to impact the market in a proportional manner. Secondly, although a very small part, the growth of mountaineering as a sport in India would also provide a big boost to the manufacturers specially the private ones, however currently it seems to be a distant future. The market is expected to grow at 8% per annum during the next three years, on account of growing demand from armed forces.

### **Key Manufacturers**

The key manufacturers of high altitude clothing are given below:

1. Ordnance Factory, Shahjahanpur
2. Shri Lakshmi Cotsyn Defence – The company has started the trial productions of High altitude clothing after its capacity expansion in 2011. It aims to become a major player in this segment in the near future.

In addition to these there are many technical textile players who supply the key raw materials to the Ordnance factories for production of HAL clothing. These are Entremonde Polycoaters - suppliers of breathable membrane fabrics, SRF, S Kumar's, Reliance , Kusumgar and Ginni Spectra.

***Import export scenario***

Currently import and export of High altitude clothing in India is insignificant.

**Quality Standards**

Quality standard for the products of ordinance factories is taken care of by DRDO.

## Outer Protective clothing

Outer protective clothing includes products like wind cheaters and rain coats made out of fabrics. These clothing items provide protection to the person from extreme weather, wind and are water resistant to keep the person dry.

### *Product Characteristics*

Rain jackets and wind – cheaters come in various types. These products are constructed in a way to protect the person from rain as well as strong winds. Each type utilizes different materials to choose from, as well as varying levels of protection and breathability. Rain jackets also come in a variety of colours and shapes to allow women to remain fashionable while being protected. The different types of rain coats available are:

- Breathable water proof rain coats – The waterproof/breathable type of rain jacket provides wearers with the protection from precipitation while the breathability of the fabric allows perspiration vapours to escape. It is recommended for use in Mountaineering, bird watching and other application where the wearer needs to put the jacket on for a longer time.
- Breathable water resistant jackets – Water Resistant rain jackets do not prevent rain from penetrating through the material, but they do delay it from happening. These are commonly known as wind cheaters, as the lamination of the fabric prevents strong winds to pass through the fabric. These are recommended for use in areas which face light rainfall.
- Hybrid soft shell jackets - This style of jacket offers a waterproof/breathable laminate that provides the same level of protection as the waterproof/breathable rain jackets. The advantages to purchasing this type of jacket is that they are extremely stretchy and offer protection if stranded in a downpour. These rain jackets are recommended for use by climbers, day hikers, and skiers in spring conditions, backpackers, fitness runners, and trail runners.
- Waterproof non- breathable jackets - This style of rain jacket is made from fully coated materials. This means that rain cannot get in, but sweat cannot escape either. They are meant for emergency use, or extremely minimal activity. This type of rain coats are commonly made of rubber and hence have not been included as a part of the segment.

### **Market size and trade trends**

The market for rain coats in India is mostly concentrated in areas having heavy rainfall like the North East and the Western Ghats. The preference of a rain coat is still very low over umbrellas due to the longer life of an umbrella and easy usability. The market is mostly concentrated in the urban regions.

### ***Market size estimate***

The market size of protective jackets – rain coats and windcheaters has been estimated using the average per capita spending on such items as per the NSSO survey done in 2011-12. The total market is estimates are as shown in the exhibit below.

Exhibit C-203: Market size estimate

	2012-13
Quantity (in Lakh nos.)	41
Value (in Rs. Crore)	102.3

\*source: IMaCS analysis, industry sources

### ***Key growth drivers and Inhibitors***

With very limited export of textile rain coats, the market is mainly dependent on the domestic consumption. While the preference of plastic and rubber rain coats is very high in the children segment and the rural areas due to the price factor, textile based rain coats and win cheaters are preferred by sports person for mountaineering and application where the wearer has to put on a rain coat for longer time duration. The key driver would be the increasing preference for these rain coats due to the comfort that they provide, which is expected to grow as the living standard and per capita income of the Nation rises. The market is expected to grow at 10% per annum during the next three years.

### ***Key Manufacturers***

Most of the rain coat manufacturers in India belong to the mall and Medium scale industry. Key Manufacturers of rain coats in India are:

- Tulsi Corporation – Bangalore

### ***Import export scenario***

India exported rain coats and wind cheaters valued at Rs. 1.5 Crore and imported rain coats and wind cheaters valued at Rs. 6.1 Crore. However, a majority of these are of plastic or rubber and not based on textiles. The import statistics are:

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Exhibit C-204: Import export trends

HS code family	HS code description	Applicable HS codes	2012-13
<b>Imports</b>			
<b>6201</b>	Overcoats, Raincoats, Carcoats, Capes, Cloaks And Similar Articles Of Wool/ Fine Animal Hair Not Knitted Or Crocheted	62011100	Rs. 6.12 Crore
	Raincoats Of Cotton Not Knitted Or Crocheted	62011120	
	Rain coat, windcheaters and ther similar articles of cotton	62011290	
	Raincoats Of Man-Made Fibres Not Knitted Or Crocheted	62011310	
	Rain coats windcheater and similar articles of other fibres	62019990	
<b>6202</b>	OVERCOATS,RAINCOATS ETC &SIMILAR ARTICLES OF COTTON	62021200	
	Overcoats,raincoats,carcoats,capes,cloaks and similar articles of man made fibres	62021300	
	Women's Or Girls' Wind & Ski-Jackets, Wind Cheaters Of Wool Or Fine Animal Hair Not Knitted Or Crocheted	62029110	
	Women's Or Girls' Wind & Ski Jackets, Wind Cheaters Of Cotton Not Knitted Or Crocheted	62029210	
	Women's Or Girls' Wind & Ski-Jackets, Wind Cheaters Of Man-Made Fibres Not Knitted Or Crocheted	62029310	
	Women's Or Girls' Wind & Ski Jackets Of Silk Of Silk Not Knitted Or Crocheted	62029911	
	Overcoats,raincoats,carcoats,capes cloaks and similar articles of other textile Materials other than silk	62029990	
<b>6210</b>	Outer Garments Of Rubberized Textile Fabrics For Women's Or Girls' Overcoats, Car-Coats, Capes, Cloaks, Anoraks, Wind-Cheaters, Wind Jackets And Similar Articles Other Than Those Of Heading 6202 Not Knitted Or Crocheted	62102010	
	Outer Garments For Women's Or Girls' Overcoats, Car-Coats, Capes, Cloaks, Anoraks, Wind-Cheaters, Wind Jackets And Similar Articles Other Than Those Of Heading 6202, Of Fabrics Impregnated, Coated, Covered Or Laminated With Preparations Of Cellulose Derivatives And Other Artificial Plastic Materials Not Knitted Or Crocheted	62102020	
	Outer Garments, Men's & Boys' Of Textile Fabrics, Otherwise Impregnated Or Coated Not Knitted Or Crocheted	62102030	
	Other Outer Garments For Men's & Boy's Not Knitted Or Crocheted	62102090	
	Other Outer Garments For Men Or Boys Of Textiles Impregnated, Coated, Covered Or Laminated With Preparation Of Cellulose Derivatives And Other Artificial Plastic Materials Not Knitted Or Crocheted	62103010	
	Outer Garments, Men Or Boys' Of Rubberised Textile Fabrics Not Knitted Or Crocheted	62103020	
	Outer Garments, Men & Boys' Of Textile Fabrics, Otherwise Impregnated Not Knitted Or Crocheted	62103030	

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HS code family	HS code description	Applicable HS codes	2012-13
6307	Life jackets and life belts of cotton	63072010	
	Life jackets & life belts of others	63072090	
<b>Exports</b>			
6201	Overcoats, Raincoats, Car-coats, Capes, Cloaks And Similar Articles Of Wool/ Fine Animal Hair Not Knitted Or Crocheted	62011100	Rs. 1.49 Crore
	Raincoats Of Cotton Not Knitted Or Crocheted	62011120	
	Rain coat, windcheaters and their similar articles of cotton	62011290	
	Raincoats Of Man-Made Fibres Not Knitted Or Crocheted	62011310	
	Rain coats windcheater and similar articles of other fibres	62019990	
6202	OVERCOATS,RAINCOATS ETC &SIMILAR ARTICLES OF COTTON	62021200	
	Overcoats,raincoats,carcoats,capes,cloaks and similar articles of man made fibres	62021300	
	Women's Or Girls' Wind & Ski-Jackets, Wind Cheaters Of Wool Or Fine Animal Hair Not Knitted Or Crocheted	62029110	
	Women's Or Girls' Wind & Ski Jackets, Wind Cheaters Of Cotton Not Knitted Or Crocheted	62029210	
	Women's Or Girls' Wind & Ski-Jackets, Wind Cheaters Of Man-Made Fibres Not Knitted Or Crocheted	62029310	
	Women's Or Girls' Wind & Ski Jackets Of Silk Of Silk Not Knitted Or Crocheted	62029911	
	Overcoats,raincoats,carcoats,capes cloaks and similar articles of other textile Materials other than silk	62029990	
6210	Outer Garments Of Rubberized Textile Fabrics For Women's Or Girls' Overcoats, Car-Coats, Capes, Cloaks, Anoraks, Wind-Cheaters, Wind Jackets And Similar Articles Other Than Those Of Heading 6202 Not Knitted Or Crocheted	62102010	
	Outer Garments For Women's Or Girls' Overcoats, Car-Coats, Capes, Cloaks, Anoraks, Wind-Cheaters, Wind Jackets And Similar Articles Other Than Those Of Heading 6202, Of Fabrics Impregnated, Coated, Covered Or Laminated With Preparations Of Cellulose Derivatives And Other Artificial Plastic Materials Not Knitted Or Crocheted	62102020	
	Outer Garments, Men's & Boys' Of Textile Fabrics, Otherwise Impregnated Or Coated Not Knitted Or Crocheted	62102030	
	Other Outer Garments For Men's & Boy's Not Knitted Or Crocheted	62102090	
	Other Outer Garments For Men Or Boys Of Textiles Impregnated, Coated, Covered Or Laminated With Preparation Of Cellulose Derivatives And Other Artificial Plastic Materials Not Knitted Or Crocheted	62103010	
	Outer Garments, Men Or Boys' Of Rubberised Textile Fabrics Not Knitted Or Crocheted	62103020	

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HS code family	HS code description	Applicable HS codes	2012-13
	Outer Garments, Men & Boys' Of Textile Fabrics, Otherwise Impregnated Not Knitted Or Crocheted	62103030	
	Overcoats, Raincoats, Carcoats, Capes, Cloaks And Similar Articles Of Wool/ Fine Animal Hair Not Knitted Or Crocheted	62011100	
<b>6307</b>	Life jackets and life belts of cotton	63072010	
	Life jackets & life belts of others	63072090	

*\*source: IMAcS analysis, DGCIS*

*\*Above data includes all types of raincoats and windcheaters – textiles, plastic and rubber, etc*

*Other than the above mentioned HS codes the product is also shipped in HS code family – 3924 & 3926 and 6100*

### **Quality Standards**

There are no set quality parameters of rain coats and win cheaters. However, manufacturers follow the quality parameters as requested by the buyer.

## 10. Geotech

Geotech segment comprises of technical textile products used in Geotechnical applications pertaining to soil, rock, earth etc. This class of products is loosely called Geo-textiles. However Geo-textiles specifically refers to permeable fabric or synthetic material, woven or non-woven, which can be used with geotechnical engineering material).

The principal functions performed by Geo-textiles are confinement /separation, reinforcement, filtration and drainage, and protection. Application areas include Civil Engineering (roads and pavements, slope stabilization and embankment protection, tunnels, rail-track bed stabilization, ground stabilization and drainage etc), Marine Engineering (Soil Erosion control and embankment protection, breakwaters) and Environmental Engineering (landfills and waste management).

Other specialized Geotech products comprise Geo-grids (plastics filaments and tapes etc formed into a very open, grid like configuration having large apertures), Geo-nets (extruded polymer ribs set in net like fashion with small apertures), Geo-membranes (impermeable fabric as barrier), gabions (used to prevent landslides) and Geo-composites (products using two or more Geo-textiles e.g. Pre-fabricated Drains-PVD).

The total Geo-textiles Market in India including exports is still in its very nascent stage at just Rs. 503 Crore, 91% of which is based on domestic market demand. The market size of geo-textiles is as shown in the exhibit below.

Exhibit C-205: Market size estimation

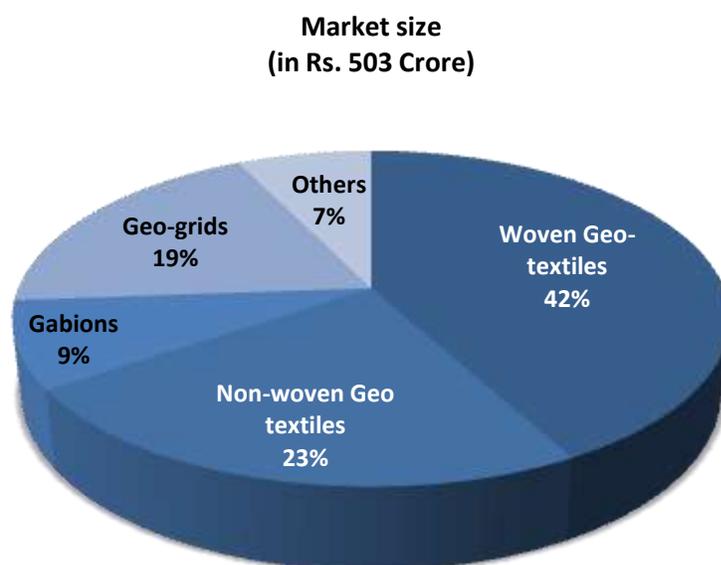
	2012-13 (All figures in Rs. Crore)				
	Production	Import	Export	Domestic Consumption	Market size
<b>Geo-textiles</b>	461	42	46	457	503

Source: IMaCS Analysis, ITTA

The market is mainly constituted by woven and non –woven geo-textiles which make up for 42% and 23% of the market. Other key products are geo-grids gabions which are increasingly used along side roads in hilly terrains and dams to prevent landslides. Other products like geo-tubes, geo-cells, geo-membranes and PVD drains have not been used considerably in India and their market is limited to less

than 10% of the geo-textile market. The market of geo-grids and non woven geo bags and tubes are expected to grow in the coming years. The market for geo-textiles is expected to grow at 8% per annum. The product wise share in total geo-textile market is as shown in the exhibit below.

Exhibit C-206: Market size pie product wise



Source: IMAcS analysis

### Key Players

The key players of the segment are:

- Techfab India Ltd.
- Strata Geosynthetics Ltd.
- Neo Corp India Ltd.
- Garware Wall Ropes
- Flexituff Intenational
- SKAPS Ltd.
- Maccaferri Environmental Solutions
- Terram India Ltd.
- Ambica Polymers
- SVM Non -wovens

### ***Functions of geo-textiles***

Geo-textiles can be defined as any permeable fabric or synthetic material, woven or non-woven, which when can be used in association with soil, rock, earth or any other geotechnical engineering related material. The principal functions performed by Geo-textiles are confinement /separation, reinforcement, filtration and drainage, and protection. These functions can be described thus:

#### **a) Confinement / Separation:**

Confinement provides a media between the aggregate and the subsoil which absorbs the load in the form of tension and prevents change in alignment of the aggregate. Geo-textile economically helps the separation concept of keeping two dissimilar materials apart to maximise the physical attributes of each of those materials. The object of separation by geo-textiles is to prevent a well defined material or rich material from penetrating the sub-grade or the poor soil. If the separating media of geo-textiles is absent, the infiltration of the sub-grade decreases permeability of the aggregate to the point where it cannot adequately transport the water reaching it. Suitable geo-textile fabric with good puncture/tear resistance when used as a separator media - eliminates the loss of costly aggregate material into subsoil, prevents upward pumping of subsoil, eliminates contamination and maintains porosity of different levels. This kind of function finds application in construction of road s and railways tracks, where a geo-textile layer is put beneath the road, to prevent the gravel from mixing into the soil, thus increasing the life of the road by two to three times. For separation purposes, both woven / nonwoven geo-textiles may be used.

#### **b) Reinforcement:**

The purpose of geo-textiles in the reinforcement function is to reinforce the weak sub-grade or subsoil. It helps to strengthen the soil surface and to increase the soils ability to stay put especially on the slopes. Due to this the slopes are stabilised either permanently or temporarily and creep stops or at least diminishes. Further, it helps in preventing water from permeating a slope and controlling the amount of infiltration that occurs during various rain events. Reinforcing aspect of geo-textiles can be used for roads, temporary roads, pavements, air strips, stabilised road slopes, retaining walls, containment systems, controlling reflective cracking, fibre or fabric reinforced concrete etc. Asphalt impregnated geo-textile is used as a paving fabric, relieving stress and acting as moisture barrier. For reinforcement synthetic woven fabric or spun-bond is preferred. Reinforcement is further enhanced by use of geo-grids or geo-nets.

**Filtration:**

The purpose of geo-textiles with reference to drainage and filtration is simply to retain soil while allowing the passage of water. When geo-textiles are used as drains, the water flow is within the plane of the geo-textile itself i.e., they have high lateral permeability. At the same time, geo-textiles must possess adequate dimensional stability to retain their thickness under pressure. The life of pavement of highways/air fields etc is affected by the time for which the water remains under the structural section and its drainage system which is responsible for the removal of free water which is fed directly from the stone base course beneath the structure. Needle punched nonwoven is the preferred geo-textile for such applications where primary requirement is filtration.

**c) Drainage:**

The use of geo-textiles in drainage has made significant strides in changing the conventional procedure of using graded filters. Outstanding advantages of geo-textiles in drainage are:

- It eliminates the filter sand with the dual media backfill.
- In some cases, it eliminates the need for perforated pipes.
- In situations where only sand backfill is available, it is possible to wrap the drainage pipe with fabric to act as a screening agent. The fabric, thereby, prevents the sand from entering perforation in the pipe.
- With Geo-textiles, trench excavation is considerably reduced.
- Many times the use of geo-textiles eliminates the need for trench shoring.

Needle-punched nonwoven geo-textile is preferred where drainage is the primary functional requirement.

**d) Protection:**

Lining is used for cushioning and protection of membrane used for applications such as land fill and waste containment from puncture or tearing by sharp stone or stress. Geo-textiles can also be impregnated with polymeric or mineral sealing materials such as bentonite clay to provide flexible barriers to mixture. Usually spun bond or needle-punched nonwovens are preferred for such applications.

Each of these functions calls for highly specific textile performance characteristics. As the functional requirements are to be met over many years of the life of the civil construction, durability is often a very key requirement. Many applications require several of the above functions to be met simultaneously.

Further, the cost of the geotechnical solution is also an important factor to be taken into account in evaluating solutions.

Further, specialized geo-textile products designed for a specific function are discussed as follows:

- **Geo-grids** represent a rapidly growing segment within the geo-textiles area. Geo-grids are plastics filaments, roving, and tapes etc formed into a very open, grid like configuration having large apertures, unlike woven, nonwoven or knit textiles. These apertures may vary in size from 1 to even more than 10 cm. They can be mono-axial or bi-axial i.e. be stretched in one or two directions for improved physical properties. Geo-grids are mainly used for reinforcement – beneath aggregate in unpaved roads, reinforcement of embankment fills/earth dams, repairing slope failures/landslides, as inserts between geo-textiles/geo-membranes etc.
- **Geo-nets** constitute another specialized segment within the geo-synthetic area. Geo-nets are usually formed by a continuous extrusion of parallel sets of polymeric ribs at acute angles to one another. When the ribs are opened, relatively large apertures are formed into a netlike configuration. Geo-nets are made of polypropylene (PP) or Polyethylene (PE). Geo-nets are used almost exclusively for their drainage capability for applications like water drainage behind retaining walls, seeping rock slopes, beneath sport fields, building foundations; leachate drainage of landfill side slopes, above landfill liners and surface water drainage within landfill caps.
- **Geo-membranes** are impermeable membranes, used where the primary function is to have an impervious barrier for fluids. However, as the possibility of punctures or tears is high in many areas of use, it is common to protect these membranes by use of Geo-textiles. Often the geo-textiles also perform other functions besides protection of the membrane. Geo-membranes are made from continuous polymeric sheets that are very flexible, but can also be made by impregnation of geo-textile with asphalt or elastomer sprays or bitumen composites. Geo-membranes are used in applications such as liners for water canals, waste canals, solid-waste landfills, covers for solid-waste landfills, waterproofing within tunnels, to control odours in landfills, to prevent infiltration of water in sensitive areas, and beneath asphalt overlays as a waterproofing layer.

- **Geo-composites** consist of two or more geo-synthetic products put together to increase the combinations ability to optimally address the specific application (say filtration/ reinforcement etc) at minimum cost. The best features of different materials are combined in such a way that the benefit/cost ratio is maximized. An example of this is known as wick drains in the U.S. and prefabricated vertical drains, PVDs, in Europe. These consist of a 100 mm wide by 5 mm thick polymer cores, for conducting water, with a geo-textile acting as a filter and separator socked around the core.
- **Gabions** are rectangular or cylindrical containers fabricated from polymer/metal meshes, usually filled with stone and used for structural purposes (retaining walls, slope and embankment protection etc). These have been used in India since 70s.

### ***Product characteristics***

In general, the vast majority of Geo-textiles are made from polypropylene (PP), polyethylene or polyester formed into fabrics based on type of process. The mechanical and hydraulic properties vary widely depending on type of application designed for. Depending on type (woven/non-woven), process (thermal bonded/resin bonded), desired performance specifications (load bearing ability, tear resistance etc), Geo-textiles can range from under 40 GSM to over 3000 GSM (used in landfill applications). Geo-grids are usually knitted and PVC coated. Products are designed to be resistant to mildew, bacteria, soil acids (PP) and alkalis (PP, PES) and most chemicals.

Apart from the above, Agro based Geo-textiles (woven textiles based on Jute, Coir) are also a niche but growing segment. These have the advantage of being bio-degradable as well as being cheaper. As a result in low cost projects of shorter life span, natural fibre based geo-textiles mostly coir and Jute geo-textiles are used. Recently, use of Jute geo-textile in making of village level roads is being tested in Karnataka. Another breakthrough has been the preference for coir based geo-textile for use along with the railway track laying.

### ***Key Applications***

Key applications of geo-textiles include the following:

- **Roadways:** Geo-textiles help in improving the longevity of a road by about 2 to 2.5 times. Geo-textiles can be used for base reinforcement, separation and draining functions. Different applications are as follows:

- Geo-textile is used for providing a separation layer between the ballast and the soil layer, thus preventing sinking of ballast into the soil, and increasing longevity of the road.
- Geo-textiles also provide a porous membrane beneath the road, which lets the water to pass through into the soil and thus preventing road damage through water coagulation. This has been a major issue for the Roadways in the Himalayan regions having high snowfall, where roads have to be repaired almost on a yearly basis due to damage from the water after the snow melts.

While use of synthetic geo-textiles is increasingly being done for construction of major roads – Highways and expressways, use of coir geo-textiles which is cheaper and bio-degradable is being proposed for district level and village level roads. A pilot project of construction of roads using coir geo-textile has been taken up by nine states. Roadways, continues to be the largest consumer of geo-textiles in India.

- **Railways:** Geo-textiles can be used in Railways for track bed design and increasing the stability of the surface, protection of erosion of slope and for protection against rock falls. The key applications in railways are as discussed below:
  - About 700 km of Indian railways is built on weak formation of soil, which requires regular repairs. Use of geo textiles as a base would help in spreading the load across the soil while preventing sinking of the track ballast, thus reducing the repair requirements of the track. This would also make the track more stable and suitable for higher axle load traffic, the kind which is being planned in the proposed in the Delhi- Mumbai corridor.
  - Gabions are used along the railway tracks in hilly areas for protecting rock fall.
  - AS Reinforced Earth Embankments: Geo-textiles are used to hold RE embankments along the railway track where the soil layer is loose and chances of landslides are higher. Along the Udhampur- Jammu route, near the bridge on Tawi river, Railways has constructed a similar embankment of 35 m height.
  - Use of biaxial geo-grids is being tested for use in pilot projects in four divisions of Indian railways – NF railways, N railways, EC railways and SC railways.
  - Prefabricated Vertical drains (PVDs) can be used to expedite soil consolidation in weak soil clayey regions, where the top soil is non porous and weak thus, increasing risk of ground sinking.

While the use of geo-textiles is increasing, more tests and pilot projects are being done to see the advantages of geo-textiles for Indian railways. The market is expected to increase at a growing pace in the coming years.

- **Major Ports and river banks:** Geo tubes, Geo-membranes and geo-bags are often used at ports to prevent shore line erosion by water at ports. A geo-tube sea wall is being constructed at Upadda village in East Godavari District of Andhra Pradesh for prevention of erosion by sea. Geo-tubes are also being used at Kolkata Port on an experimental basis. While the penetration of geo-textiles is not significant at present, the preference for use of geo-textiles for ports is growing and market is expected to grow at a goods rate in the coming ten years.
- **Urban Infrastructure:** PVDs can be used for construction of roads and settlements at areas having weak clayey soil. PVDs increase the rate of water flow through the soil and help the consolidation to occur in just months instead of years, thus making the construction far more stable.

In addition to these, geo textiles can also be used to provide base reinforcement in the power sector and airport runways. However, such specialised applications are not currently being done in India.

### ***Market trends and growth drivers***

The market of geo-textile in India is mainly dependent on the investments coming in the road infrastructure sector and the railway infrastructure sector. With the pressing need of having adequate infrastructure in terms of roadways, railways and ports infrastructure, Government has been doing substantial investment towards infrastructure building. Due to limited penetration and various trail programmes going on in different states, the use of geo-textiles is limited to just expressways and National Highways. The proposed investment for the XIIth plan for Infrastructure development in key sectors and the potential for use of geo-textiles in these sectors is shown in the exhibit below:

**Exhibit C-207: Demand estimation for geo-textiles**

<b>In Rs. Crore</b>	<b>2012-17 - Proposed Investment</b>	<b>Projects with potential of using geo-textiles</b>	<b>Penetration of Geo-textile</b>	<b>Spending on geo textiles</b>	<b>Spending on geo-textile for 2012-13</b>
Roads (Excluding state level roads)	483323	386,658	77,332	1,160	232
Railways	273083	218,466	43,693	437	87
Ports	180626	144,501	14,450	217	43
Airports	17500	8,750	875	4	1

In Rs. Crore	2012-17 - Proposed Investment	Projects with potential of using geo-textiles	Penetration of Geo-textile	Spending on geo textiles	Spending on geo-textile for 2012-13
Power	354260	106,278	5,314	53	11
Urban Infrastructure	10000	2,000	400	8	2
Other Infrastructure	4099239	409,924	20,496	410	82
<b>Total</b>					<b>458</b>

Source: Various working group reports for XII<sup>th</sup> five year plan  
 Working group report on roads under central govt. for 2012-17  
 Working group report on railways for 2012-17  
 Working group report on Ports sector for 2012-17  
 Working group report on power sector for 2012-17  
 Working group report on Civil Aviation -2012-17  
 Working group report on Urban Infrastructure 2012-17  
 Discussion paper on financial requirement for infrastructure and industry – Sept. 2012

The proposed investment for the XII<sup>th</sup> five year plan is significantly higher than the XI<sup>th</sup> five year plan indicating the government is more concerned about development of adequate infrastructure in the country. This is expected to act as a booster for various industries associated with infrastructure development like geo-textiles.

Another key growth factor for geo-textiles is the fact that the benefits of using geo-textiles are now being widely acclaimed across the infrastructure sector of India and the Government is keenly exploring opportunities for use of geo-textiles in infrastructure projects. Various trials for use of geo-textiles in ports sector, railways and roadways are underway. This is expected to help the geo-textile industry to grow at a significant rate of 8% during the next three years.

### **Key Manufacturers**

Key manufacturers of geo-textiles in India have already been discussed in the introductory section.

### **Import Export scenario**

With the growing domestic demand for geo-textiles many manufacturers have started producing geo-textiles in the country; this has led to significant decline in imports of geo-textiles from Rs. 105 Crore in 2007-08 to Rs. 42 Crore in 2012-13 declining at 14% y-o-y. Export of geo textile from India for 2012-13 is estimated at Rs. 46 crore. Players like Ambica Polymers and SKAPS are export oriented units. The export and import statistics has been shown in the exhibit below:

Exhibit C-208: Import export trends

HS code family	2007-08	2012-13
<b>Imports</b>		
3920, 3923, 3925 & 3926	Rs. 105 Crore	Rs. 42 Crore
5310 & 5311		
5402 & 5407		
5602 & 5603		
5701		
5903, 5906, 5907 & 5911		
6301, 6305 & 6307		
6806, 6807 & 6815		
7308 & 7311		
<b>Exports</b>		
3920, 3923, 3925 & 3926	Rs. 87 Crore	Rs. 46 Crore
5310 & 5311		
5402 & 5407		
5602 & 5603		
5701		
5903, 5906, 5907 & 5911		
6301, 6305 & 6307		
6806, 6807 & 6815		
7308 & 7311		

\*source: IMAcS analysis, DGCIIS

The key HS codes under which geo-textiles are being traded are shown as under:

Exhibit C-209: HS codes for geo-textiles

HS code family	HS Code	Description
3824	38244090	Others
3901	39011090	Other polyethylene having a specific gravity < 0.94
3917	39174000	Fittings for tubes pipes and hoses of plastic
3920	39201012	Sheets of polyethylene: flexible, plain
	39201019	Other sheets of polyethylene
	39201092	Other plates, sheet etc of polymers of ethylene flexible, plain
	39201099	Other plates, sheet of polymers of ethylene nes
	39205999	Other sheets etc of other acrylic polymer nes
3923	39232990	Sack and bag (including cones)of other plastic nes
3925	39259090	Other builders ware of plastics nes
3926	39269099	Other article of plastic nes
5310	53101013	Hessian cloth containing 100% by wt of jute
	53101099	Other woven fabrics containing jute >= 50%
	53109099	Others
5311	53110015	Of coir including log form and geo textiles
	53110019	Other woven fabrics of other veg textile

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HS code family	HS Code	Description
	53110029	Other woven fabrics of paper yarn
<b>5407</b>	54023300	Textured yarn of polyester
	54071019	Unbleached other polyester fabrics
	54071039	Other dyed polyester fabrics
	54072090	Other woven fabrics from strip/the like
	54077200	Woven fabrics, containing 85% or more by wt of other synthetic filaments, dyed
	54077400	Woven fabrics containing 85% or more by wt of other synthetic filaments, printed
	54079110	Other synthetic woven fabrics – unbleached
<b>5603</b>	56021000	Needle loom felt and stitch bonded FIBR fabrics
	56022990	Other textile felt
	56031100	Man-made filament weighing
	56031200	Man-made filament weighing >25g /sqm
	56031300	Man-made filament weighing between 70g/sqm and 150g/sqm
	56031400	Man-made filament weighing >150g/sqm
	56039300	Other filament weighing between 70g/sqm and 150g/sqm
	56039400	Other filament weighing >150g/sqm
<b>5701 &amp; 5702</b>	57019020	Of coir including geo textile
	57022020	Coir carpets and other rugs
<b>5903</b>	59031090	Other fabric plated laminated coated impregnated with other plastics
<b>5911</b>	59111000	Textile fabrics felt and felt-industrial woven fabrics coated covered with rubber etc for card clothing and similar fabrics for other technological properties including naro
	59119090	
<b>6305</b>	63051080	
	63053900	Jute soil savers
<b>6307</b>	63079090	Other made up articles other than cotton
	68079090	Other roofing in other form
<b>7308</b>	73089090	Other structure and parts of structures of iron and steel(excl floating structures)
<b>7314</b>	73141990	Others
	73142090	Others
	73144110	Wire netting
	73144190	Others
	73144290	Others

\*IMaCS analysis

### ***Manufacturing process and Type of Raw materials***

Geo-textiles are manufactured from polypropylene, polyester or polyethylene which can be either woven or non-woven. Manufacturing process for Woven products includes Weaving / Knitting and Coating (PVC). Products can be - woven multi-filament, woven slit-film monofilament and woven slit-film multifilament. The non-woven Geo-textiles can be made from heat bonding or needle-punching. Geogrids are knitted, while Geonets and Geomembranes are extruded from HDPE.

### ***Key machinery***

Most units surveyed used Sulzer looms for manufacturing Woven Geo-textiles. Knitting machines from Karl Mayer are also used. Nonwoven needle-punching lines from Hunter, Dilo Group and Trutzschler are used. In India, the leading machinery vendors are represented by ATE and Voltas.

### ***Quality Standards***

Indian standards for geo-textiles are as shown below:

- IS 13162:1991
- IS 13321:1992
- IS 13325:1992
- IS 13326:1992
- IS 14294:1995
- IS 14324:1995
- IS 14706: 1999
- IS 14714: 1999
- IS 14715: 2000
- IS 14715: 2013
- IS 14716: 1999
- IS 14739: 1999
- IS 14986: 2001
- IS 15060: 2001
- IS 15868:2008
- IS 15869: 2008
- IS 15871: 2009
- IS 15909: 2010
- IS 15910:2010
- IS 16090: 2013

Manufacturers also follow ASTM and EN standards.

## **11. Oekotech**

Oekotech segment refers to use of technical textiles in Environmental Engineering. The primary segment in this is Landfill waste management. This refers to the use of Geosynthetic products to secure landfills against leakage of municipal or hazardous waste. Other areas include secondary protection in Chemical/Oil Industries (ground covers and the like around process tanks for secondary containment should the tanks leak).

A modern engineering landfill has the following components - a basal lining system to prevent the contamination of soil, and ground water by pollutants, a capping system to seal the waste when the capacity of the landfill is exhausted, an impervious sealing layer which prevents the entry of pollutants in the ground, a leachate collection system for the collection and transmission of leachates to a collection pit, a secondary leachate collection/leak detection system.

Oekotech application segment includes concepts in environmental protection, waste disposal and recycling. The most well known concept is the use of geosynthetic products (discussed earlier in Geotech) in Landfill management. Secure landfills are considered to be the best available technical option for the safe disposal of large volumes of solid waste/slurry. Waste management (both Municipal and Hazardous) has become a major environmental issue in India as well as other countries.

A modern engineering landfill has the following components - a basal lining system to prevent the contamination of soil, and ground water by pollutants, a capping system to seal the waste when the capacity of the landfill is exhausted, an impervious sealing layer which prevents the entry of pollutants in the ground, a leachate collection system for the collection and transmission of leachates to a collection pit, a secondary leachate collection/leak detection system.

### ***Introduction to products***

Geo-synthetics are extensively used in the design of both base and cover liner systems of landfill facilities. The products include:

- Geo-grids: It can be used to reinforce slopes beneath the waste, reinforce walls as well as to reinforce cover soils above geo-membranes;
- Geo-nets, which can be used for in-plane drainage;
- Geo-membranes, which are relatively impermeable sheets of polymeric formulations that can be used as a barrier to liquids, gases and/or vapours; provide the critical functions of leachate containment, protection of ground water and Landfill Gas (LFG). They are also used in landfill caps.

- Geo-composites, which consist of two or more geosynthetics, can be used for separation, filtration or drainage;
- Geo-synthetic clay liners (GCLs), which are composite materials consisting of Bentonite and geosynthetics that can be used as an infiltration/hydraulic barrier; they find application not only in landfills/waste management but also for mine rehabilitation, tunnels, secondary containment e.g. of petrochemicals, landscaping etc.
- Geo-pipes, which can be used in landfill applications to facilitate collection and rapid drainage of the leachate to a sump and removal system
- Geo-textiles, which can be used for filtration purpose or as cushion to protect the geo-membrane from puncture.

### ***Product Characteristics***

Both woven and non-woven geosynthetics are used. Geo-synthetic clay liners consist of non-woven fabric layers of 180-250 GSM with an intermediate layer of Bentonite mineral (Unit Mass: 1-5 kg/sq m). Geo-textiles used for filtration/cushion are typically high GSM (285 – 3000) non-woven fabrics. HDPE geo-membranes are manufactured using approximately 97% high molecular weight polyethylene, 2 to 3% carbon black, and 0.5 to 1.0% stabilizers and antioxidants. Some salient features of HDPE geo-membrane include chemical resistance, low permeability and ultraviolet resistance. The thickness of this geo-membrane is 2 mm.

### **Market Size and trade trends**

Issue of waste management has seen rising public and government awareness over the years. Waste can be categorized as Municipal Solid Waste (MSW) and Hazardous Waste (HW).

The per capita MSW generated in India ranges from above 100 grams in small town to over 600 grams in large cities. The total MSW generated in India during 2009 to 2012 was estimated to be of 1.27 Million MTPA as per the status report of CPCB. These wastes are either recycled or land-filled or incinerated. In India these are collected by respective municipalities and transported to disposal sites which are normally low lying areas outside the city. While focus on recycling is increasing, the preference for land-filling of these waste is decreasing due to the increased cost of land filling as the land filling sites are quickly occupied due to the increase waste production. Given the limited revenues of municipalities, most bodies have not been able to afford the treatment and disposal of MSW required under environmental guidelines. Not surprisingly, many urban waste sites pose a serious health hazard for the

semi-urban/rural communities nearby. Municipal Solid Wastes (Management & Handling) Rules, 2000 (MSW Rules) are applicable to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid. Only the seven metro cities in India generate MSW in excess of 1000 MTPA with highest generation from Delhi and Chennai. Due to the high cost of land filling site and its operation and management, currently engineered land filling sites are available only at these places.

Hazardous waste consists of corrosive, reactive, ignitable and toxic wastes. India produces about 2.7 million MT of land-fillable Hazardous Waste every year, as per CPCB report of 2009. The findings of the same are as tabulated in the exhibit below.

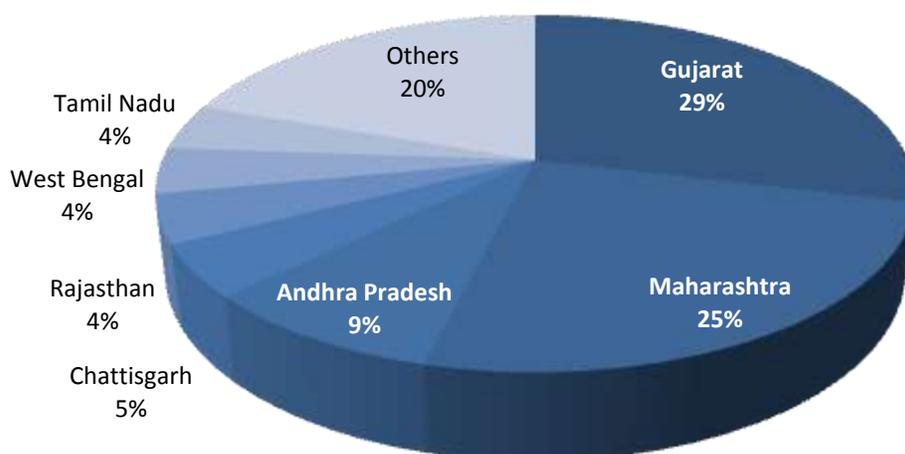
**Exhibit C-210: Hazardous waste generation**

Sl. No.	Hazardous waste category	Quantity of waste generated (in Million MTPA)	Percentage share
1	Land- fillable HW	2.72	44%
2	Inenarrable HW	0.42	7%
3	Recyclable HW	3.09	49%
	Total	6.23	

*Source: National Inventory of Hazardous Wastes Generating Industries & Hazardous Waste Management in India – CPCB – Feb 2009*

Gujarat and Maharashtra are the top two Hazardous waste generating states in India accounting for over 50% of Hazardous waste generated. Seven states shown in the exhibit account for over 80% of the HW generated in India.

## HW generated



Source: National Inventory of Hazardous Wastes Generating Industries & Hazardous Waste Management in India – CPCB – Feb 2009

Common Treatment, Storage and Disposal Facilities (TDSF) are developed for the disposal of land disposable HW at 22 different places in 10 States in Gujarat and Maharashtra. The list of waste disposal facilities across states is as shown in the exhibit below:

**Exhibit C-211: Distribution of TDSF for HW disposal**

Sl. No.	State	No. of TDSF
1	Gujarat	7
2	Maharashtra	4
3	Uttar Pradesh	3
4	Andhra Pradesh	2
5	Himachal Pradesh	1
6	Madhya Pradesh	1
7	Punjab	1
8	Rajasthan	1
9	Tamil Nadu	1
10	West Bengal	1
	<b>Total</b>	<b>22</b>

Total waste handling capacities (disposal capacity) of these facilities is 1.5 million MTPA which is just 55% of the present generation of 2.7 million MTPA of land-disposable Hazardous waste. This shows a clear requirement of close of close to 1.2 million MTPA capacity for land fillable waste disposal. This clearly indicates that in future the land-fillable waste disposal capacity is expected to increase to almost double the current size, indicating goods prospects for use of geo-textiles for oekotech purposes.

***Market Size estimate***

As geo-textile products are used in oeko-tech applications, the market of oeko-tech overlaps with that of geo-textiles. The total market of geo-textiles including that of oeko-tech has been shown in the section of geo-textiles. The details of import export and key manufacturers have also been captured alongside geo-textiles. The market of both geotech and okeotech is expected to grow at 8% per annum during the coming three years.

## **12. Indutech**

Indutech includes technical textile products used in the manufacturing sector. The technical textile products covered under Indutech are given below:-

- Conveyor belts (TT component)
- Drive belts (TT component)
- Cigarette filter rods
- Decatising cloth
- Bolting cloth
- AGM glass battery separators
- Coated abrasives (TT component)
- Ropes & cordages
- Composites (technical textiles component)
- Printed circuit boards (TT component)
- Computer printer ribbon
- Paper making fabrics
- Filtration Products
- Industrial Brushes

Technical textiles consumption under Indutech in India is estimated at Rs 5,554 Crore. Market size of Indutech, taken to be the sum of consumption and exports value is Rs. 7,045 Crore. The single largest contributor to the segment of Indutech is the ropes and cordages with a market size of 2,327 Crore and accounting for 33% of the market size of Indutech. The domestic consumption for ropes and cordages stands at Rs. 1,618 Crore. The other two major segments that along with ropes and cordages constitute over 60% of market size are Indutech are composites and coated abrasives accounting for 20% and 11% of the market size.

Overall, exports for segments of Indutech are estimated to be of Rs. 1,491 Crore. The domestic consumption stands at Rs. 5,554 Crore and imports at Rs. 1,501 Crore which accounts for 27% of the domestic consumption.

The imports, exports, domestic consumption and market size of all products segments have been summarized in the following exhibit

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Exhibit C-212: Market size estimates - Indutech

Products (Values in Rs. Crore)	Production	Imports	Exports	Domestic Consumption	Market size
Conveyor belts (TT component)	543.09	90.73	414.20	219.62	633.82
Drive belts(TT component)	64.24	109.90	63.14	111.00	174.14
Cigarette filter rods	421.21	1.81	29.20	393.82	423.02
Decatising cloth	35.25	5.85	--	41.10	41.10
Bolting cloth	24.55	6.99	1.54	30.00	31.54
AGM glass battery separators <sup>10</sup>	--	--	64.45	163.40	227.85
Coated abrasives(TT component)*	--	--	--	750.00	750.00
Ropes and cordages	2256.59	70.55	709.00	1618.14	2327.14
Glass fabrics as a part of composites (TT component)	923.79	498.56	201.78	1220.57	1422.35
Printed circuit boards(TT component)	—	28.99	--	28.99	28.99
Computers printer ribbon	219.76	66.48	1.32	284.92	286.24
Filtration products	289.81	6.48	2.29	294.00	296.29
Paper making fabrics	146.63	67.33	3.88	210.08	213.96
Industrial brushes	188.43	--	--	188.43	188.43
<b>Total</b>		<b>1501.45</b>	<b>1490.80</b>	<b>5554.07</b>	<b>7044.87</b>

<sup>10</sup> Import data for AGM battery separators is under review

## Conveyor Belts

Belt Conveyor system is a fastest, environment friendly & economical mode of bulk transportation. The conveyor belt is used to move unit loads individually and bulk loads continuously.

### Product description

A Conveyor belt consists of three components: Cover, Carcass and Insulation – the bonding medium for the carcass. Belting fabrics are used for reinforcing these conveyor belts.

The carcass is sandwiched between two covers, the face cover for the carrying side and the back cover for the pulley side with the face cover being thicker as it is subject to more wear and tear. The quality of cover will depend on the material to be handled, its abrasive quality and lump size and the service conditions. The carcass provides the strength for transmitting the power to drive the conveyor and to support the load carried on the belt. The belt strength is determined by the combined strength of the plies (Generally two- or three- ply belting). The insulation medium within the carcass of any belt separates the plies to prevent chafing; permits the belt to flex, imparts good adhesion to bind the carcass, supports the load; absorbs energy on impact at the loading point and properties for the application – resistance to heat, oil or fire.

Conveyor belts can be classified as rubber conveyor belts and PVC conveyor belts. Rubber based belting can be textile reinforced or steel reinforced. Textile reinforced belts are primarily of Nylon, polyester. Most of the steel cord belts are used in the mining sector

The belts can be classified based on their application as General Purpose, Heat-resistant, Fire-resistant, Oil-resistance, Food grade etc.

### Market size and trade trends

#### *Market size estimate*

The production of textile reinforced conveyor belting in India is estimated at 69,700 MT and Rs. 287.12 Crore. The domestic consumption for reinforcement material is estimated to be 5,028.88 tonnes which amounts to Rs 219.62 Crore up from the estimate Rs 105 Crore for 2007 – 08 registering a CAGR of 23%. The exports as mentioned in the following section are at Rs. 414.20 Crore, bringing the total market size to Rs.633.82 Crore.

Exhibit C-213: Market size estimate for TT component of conveyor belts

	2012-13
<b>Domestic consumption Quantity (in MT)</b>	5,023
<b>Domestic consumption Value (in Rs. Crore)</b>	219.62
<b>Exports (in Rs. Crore)</b>	414.20
<b>Market size (in Rs. Crore)</b>	633.82

\*source: IMaCS analysis, industry sources

### **Key growth drivers and Inhibitors**

The key growth driver of the conveyor belting industry is infrastructure development in the country. The key consumer and thus, driver industries for conveyor belts are the steel industry, power industry, cement industry, ports, fertilizers and soda ash. An overall economic boost that lifts all these sectors and facilitates large scale investments in these sectors will automatically boost demand for conveyor belting and the related technical textile consumption of the country.

### **Key Manufacturers**

The key manufactures of conveyor belting solutions are:

- Phoenix Yule
- Sempertrans Nirlon
- International Convelyo Belting Ltd.
- Fenner India Pvt Ltd
- Forech India

### **Import export scenario**

The import export scenario of the conveyor belts has been captured in the following Exhibit-C-214.

Exhibit-C-214: Export Import trends for conveyor belts

Applicable family	HS code	HS codes	(2012-13)
<b>Imports</b>			
<b>3926, 4010, 5910</b>		39269010, 39269099, 40101210, 40101290, 59100010, 59100020, 59100030, 59100040, 59100050, 59100060, 59100090, 59119090	Rs. 90.73 Crore
<b>Exports</b>			

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Applicable family	HS code	HS codes	(2012-13)
<b>3926, 4010, 5910</b>		54021910, 54021990, 54022090, 54031020, 54031090, 56075020, 59021090, 59022090, 59029010, 59029090, 59021010, 59022010	Rs. 414.20 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

## Drive belts

A belt drive is a method of transferring rotary motion between two shafts. A belt drive includes one pulley on each shaft and one or more continuous belts over the two pulleys. The motion of the driving pulley is, generally, transferred to the driven pulley via the friction between the belt and the pulley.

### Product description

The transmission belts can be classified as Flat, Vee, Poly-Vee, Timing/synchronous belts etc. Vee belts (or V Belts) are the most widely used belts. V belt drives replaced flat belt drives for many applications because higher power could be transmitted with more compact drive arrangements. V Belt Drives achieve drive efficiencies of about 95%.

V belts are used in alternators, air conditioning compressors, power steering pumps and water pumps, apart from fans in automobiles as well as a number of industries. There are different types of V-belts; some of them are wedge section V belts; high capacity narrow V-belts; hexagonal V-belts; multi rib poly V-belts; automotive timing belts; auto wrapped belts in wedge and classical types; and variable speed drive belts for two wheeler applications. Generally three types of V belts are commonly used: raw – edged, v-ribbed, and wrapped. They come in five standard sizes A, B, C, D and E. The top width of A is 12.7 mm (1/2 in) and that of E is mm (1) and the thickness varies between the different sizes. When power transmitted is heavy multiple belts are used in pulleys having a number of grooves as required.

The selection of the type of V belt depends on the power capacity of the drive and the small pulley's shaft speed (rev/s), acceptable limits of the speed ratio, pitch length of the belt(s), and diameters of the two pulleys etc. When correctly specified, V belts can be expected to deliver 25000 hours of service (around 3 years continuous, or 5 years normal use) before belt replacement is required.

### Market size and trade trends

#### *Market size estimate*

The domestic consumption of drive belts is estimated to be at Rs 711.40 Crore and 6.9 Crore pieces. The corresponding Technical Textile component is pegged at a quantity of 6730 MT worth Rs. 111 Crore, indicating a CAGR growth of 5.80% over the 2007-08 estimate of Rs. 84 Crore. With exports at Rs.63.14 Crore, the market size for technical textile component in drive belts is Rs. 174.14 Crore.

Exhibit C-215: Market size estimate of drive belts

	2012-13
Domestic consumption of drive belts (in Crore pcs)	6.9
Domestic consumption of drive belts Value (in Rs. Crore)	711.40
Domestic consumption of quantity of TT component in drive belts (in MT)	6730
Value of Domestic consumption of TT component in drive belts (in Rs. Crore)	111
Exports of Drive belts(TT component)	63.14
Market size of TT component in drive belts(in Rs. Crore)	174.14

\*source: IMAcS analysis, industry sources

### Key growth drivers and Inhibitors

V belts find applications in textile industry (textile machinery, textile spinning, texturing, weaving units), chemical and fertilizer industry, steel, engineering, railways, pharmaceuticals, cement and paper industry (printing & packaging, paper conversion) among others. The market for V belts can be broadly divided into two segments- industrial and automotive. The industrial belts account for 55-60 % of the total market.

### Key Manufacturers

Key manufacturers of drive belts include:Fenner India, Pix Transmissions and Good Year

### Import export scenario

The import export scenario for drive belts has been captured in the following Exhibit C-216.

Exhibit C-216: Export Import trends for drive belts

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>4010</b>	40103110, 40103190, 40103210, 40103290, 40103310, 40103390, 40103410, 40103490, 40103510, 40103590, 40103610, 40103690	Rs. 109.90 Crore
<b>Exports</b>		
<b>4010</b>	40103110, 40103190, 40103210, 40103290, 40103310, 40103390, 40103410, 40103490, 40103510, 40103590, 40103610, 40103690	Rs. 63.14 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCI

## Cigarette filter rods

Cigarette filter reduces harshness of tobacco smoke by reducing the amount of tar, smoke and other fine particles during combustion of the tobacco portion. The filter is primarily made-up of cellulose acetate fibres known as tow. The fibres are bonded together with a hardening agent, tri-acetin plasticizer, which helps the filter to keep its shape. The filter is wrapped in paper and sealed with a line of adhesive.

### Market size and trade trends

The total size of the filter cigarette industry in India is around 121 billion cigarettes. ITC Limited has a near monopoly with around 90.71% value market share followed by Godfrey Philips and Vazir Sultan Tobacco (VST) at 6.89% and 2.14% respectively.

### *Market size estimate*

The domestic consumption of cigarette filter rods is estimated to be at 18,485 Million rods worth Rs 393.82 Crore growing marginally at a CAGR of 0.38%. The exports at Rs. 29.20 Crore peg the market size for cigarette filter rods at Rs. 423.02 Crore.

Exhibit C-217: Market size estimate of cigarette filter rods

	2012-13
Quantity of domestic consumption of cigarette filter rods (in MT)	21,786
Value domestic consumption of cigarette filter rods (in Rs. Crore)	217.86
Exports (in Rs Crore)	29.20
Market size of cigarette filter rods (in Rs Crore)	423.02

*\*source: IMaCS analysis, industry sources*

### *Key growth drivers and Inhibitors*

A sluggish growth in the cigarette market can be attributed to the discriminatory and punitive taxation coupled with a growing incidence of smuggling and illegal manufacture. These are the biggest challenges confronted by the domestic cigarette industry. Smoking in public places was prohibited nationwide from 2 October 2008. These challenges were further compounded during the year by the steep increase of 22% in cigarette Excise Duty rates announced in the Union Budget 2012 and the increases in Value Added Tax (VAT) on cigarettes by some states.

**Import export scenario**

The import export scenario for cigarette filter rods has been captured in the following Exhibit C-218.

Exhibit C-218: Export Import trends of cigarette filter rods

Applicable HS code family	HS codes	2012-13
<b>Imports</b>		
<b>5601</b>	56012110, 56012190, 56012200, 56012900	Rs. 1.81 Crore
<b>Exports</b>		
<b>5601</b>	56012110, 56012190, 56012200, 56012900	Rs. 29.20 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

## Decatising cloth

Decatising cloth, also known as *Decatising wrapper* is an industrial fabric used in Decatising machines. The fabric is an integral part of both Open Decatising and Kier Decatising machines that are majorly used for mechanical finishing of woven fabrics.

### *Product Characteristics*

Decatising cloth is a polyamide/cotton or polyester/cotton blended woven fabric available in weights ranging from 400 gsm to 600 gsm.

### Market size and trade trends

#### *Market size estimate*

The domestic consumption for decatising cloth is estimated to be 1.8 Million metres and Rs. 41.4 Crore growing at CAGR of 6.65% from the 2007-08 consumption of Rs 30.0 Crore. The exports for decatising cloth are negligible and thus, we have the market size to be the same as the domestic consumption.

Exhibit C-219: Market size estimate of decatising cloth

	2012-13
Quantity of decatising cloth (in Mn metres)	1.8
Value (in Rs. Crore)	41.10

\*source: IMaCS analysis, industry sources

#### *Key growth drivers and Inhibitors*

Decatising cloth is mainly consumed by shirting and suiting pieces, with suiting bringing in the higher share of value. Thus, the growth of this segment is tied with the growth of suiting market in India which is luke warm given the tropical climate of the country.

#### *Key Manufacturers*

Key manufacturers of decatising Cloth include:

- Hrishikesh Textiles
- Noor Textiles, Panipat
- Marino Textile
- Bombay Dyeing

### ***Import export scenario***

The import scenario of decatizing fabric has been tabulated below in Exhibit C-220 and is a small number. Exports of the fabric are negligible.

**Exhibit C-220: Import trends for decatizing cloth**

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5911</b>	59111000, 59113290, 59119090	Rs. 5.85 Crore

*\*source: IMaCS analysis, industry sources*

### **Machinery details**

Sculzer machines are used to manufacture decatizing cloth.

### **Quality Standards**

The parameters tested for decatizing wrapper along with the test method are mentioned in the table below:

**Exhibit C-221: Parameters tested for decatizing wrapper**

Parameter	Test Method
<b>Air Permeability</b>	IS 11056:1984
<b>Strength</b>	IS 1969-1985, ASTM D 5035-95
<b>GSM</b>	IS 1964-2001, ASTM D 3776-96
<b>EPI/PPI</b>	IS 1963-1981, ASTM D 3775-03

## Bolting Cloth

Bolting cloth is a mesh fabric used primarily for screen printing in Textile industry. The fabric also has applications in filtration.

### Product characteristics

Bolting cloth is a woven fabric manufactured from polyester and nylon yarns and is available in a variety of mesh sizes.

### Market size and trade trends

#### *Market size estimate*

Based on discussions with the industry experts, the domestic consumption for bolting cloth is estimated at Rs 30 Crore. Export of Rs. 1.54 Crore sets the market size for decatising cloth at Rs. 31.54 Crore that is only marginally higher than the consumption in 2007-08.

#### *Key growth drivers and Inhibitors*

Bolting cloth is majorly used for screen printing in textile processing industry. The advent of new printing technology in India has reduced the use of screen printing, thus, impacting the demand for this fabric negatively.

#### *Key Manufacturers*

The manufacturers of bolting Cloth are:

- Bombay Bolting Centre, Mumbai
- Surat Bolting, Surat
- Khanna Bolting, Surat
- Mithil Corporation, Mumbai
- Biyani Industrial Textile (P) Limited, Indore
- Deekay Nylobolt Industries Pvt. Ltd., Pune
- Tejas Fabrics, Surat
- Sur Syntex Pvt. Ltd., Surat

In addition, many filter manufacturing units in Surat also manufacture bolting cloth.

#### *Import export scenario*

The import export scenario of bolting cloth is captured in Exhibit C-222 below.

Exhibit C-222: Export Import trends of bolting cloth

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5911</b>	59112000, 59119090	Rs. 6.99 Crore
<b>Exports</b>		
<b>5911</b>	59112000, 59119090	Rs. 1.54 Crore

*\*source: IMAcS analysis, industry sources, DGFT, DGCI*

Bolting Cloth for fine suiting is imported from Italy, Germany and United Kingdom.

## Absorbent Glass mat Battery separators

Battery separator is a porous sheet placed between the positive and negative electrodes in a liquid electrolyte, a gel electrolyte or a molten salt battery. Its function is to prevent physical contact of the positive and negative electrodes while serving as an electrolyte reservoir to enable free ionic transport. According to the structure, the separator can be divided as micro porous and non-woven.

### *Product Characteristics*

An ideal battery separator should have the properties of high porosity, small mean pore diameter, oxidation resistance, puncture resistance, thermal dimensional stability and freedom from harmful chemical contaminants, favourable voltage characteristics, retardation of antimony transfer, electrochemical compatibility and prevention of dendrite growth.

The battery separators are made of PVC, PE and non-woven glass mats (Absorbent glass mats or AGM). The glass mats are known as AGM (Absorbable Glass Mat). The battery separator market is dominated by PVC although there is a gradual migration to PE separators. In India, the storage battery industry is slowly shifting from PVC separators to Polyethylene separators. Glass mat with PVC or polyethylene is mostly used in all industrial batteries and in a few cases in automobile batteries depending on the function, customer requirement and price.

### Market size and trade trends

#### *Market size estimate*

The market size for absorbent glass mats battery separators is estimated to be Rs 227.85 Crore. The domestic consumption of 46.98 Million sqm accounts for Rs. 163.40 Crore of it. Exports worth of Rs. 64.45 Crore account for the balance.

**Exhibit C-223: Market size estimate of AGM for battery separators**

	2012-13
Quantity of domestic consumption of absorbent glass mats for battery separators (in mn sqm )	46.98 Million sqm
Value of domestic consumption of absorbent glass mats for battery separators (in Rs. Crore)	Rs. 163.40 Crore
Exports of absorbent glass mats for battery separators (in Rs. Crore)	Rs. 64.45 Crore
Value of market size of absorbent glass mats for battery separators (in Rs. Crore)	Rs. 227.85 Crore

*\*source: IMaCS analysis, industry sources*

### **Key growth drivers and Inhibitors**

The growth can be largely attributed to the relative spurt in the automotive sector from the base of 2007-08.

### **Key Manufacturers**

The major manufactures of battery separators are Daramic Industries in India.

### **Import export scenario**

The export and import scenario of absorbent glass mats used in battery separators is captured in the Exhibit C-224 below.

**Exhibit C-224: Export Import trends for absorbent glass mats for battery separators**

Applicable HS code family	HS codes	(2012-13)
<b>Exports</b>		
<b>7019, 8507, 8546</b>	70191900, 70193100, 70193200, 70195900,	Rs. 64.45
	70199010, 70199090, 85079010, 85079090,	Crore
	85469090	

*\*source: IMaCS analysis, industry sources, DGFT, DGCIS*

## **Coated Abrasives**

An abrasive material is used to finish a work piece through rubbing the surface of the work piece. Abrasives are primarily used in industrial applications like grinding, polishing, buffing, honing, cutting, smoothening etc. The coated abrasives are classified into two broad categories: Woven coated abrasives and Non-woven coated abrasives.

### **Product Characteristics**

The cloths used are cotton, polyester and polyester blends, processed to obtain a suitable coated abrasives backing. These backings have special characteristics as weight, tensile strength and flexibility. The type of backing cloth used is Jeans cloth called “J” weight cloth, Drills cloth called “X” weight cloth and Sateen called “S” weight cloth. Jeans cloth is lighter and more flexible, while Drills cloth is stronger and used in the manufacturing of coated abrasives to work under medium and heavy duty pressures. There are two sides of the drill cloth which are different from each other. One side bears a net of fine lining if seen carefully and this side is called drilled side of the cloth. Drill side is filled with fillers. The other side of the cloth is called the coating side.

"J" weight cloth typically has a weight of about 130-195 GSM."X" weight cloth typically has a weight of about 200-245 GSM and "Y" weight cloth typically has a weight of about 270-330 GSM.

The non-woven coated abrasives are made from abrasive grade fibres and made available for usage in various sizes and forms.

### **Market size and trade trends**

#### ***Market size estimate***

The market size of coated abrasives is estimated to be Rs. 758 Crore with a major Rs. 750 Crore of this being accounted by domestic consumption.

The abrasives market is estimated to be at. Rs. 2,500 Crore in 2012-13<sup>11</sup>. CUMI and Grindwell Norton contribute to about 70% of the market together. 60% of the abrasives market is coated abrasives.

Exhibit C-225: Market sizing of coated abrasives

	2012-13
<b>Value of domestic consumption (in Rs. Crore)</b>	750.00
<b>Value of exports of abrasive cloth (in Rs. Crore)</b>	8.56
<b>Market size of exports of abrasive cloth (in Rs. Crore)</b>	758.56

Source: Industry Survey, IMAcS Analysis

#### ***Key growth drivers and Inhibitors***

The Abrasives business caters to a number of industries such as Steel, Automobiles, Auto components, General Metal Fabrication and Woodworking. The Abrasives Market is clearly evolving from two major players to multi-players.

#### ***Key Manufacturers***

The key manufactures of coated abrasives are Carborundum Universal, Grindwell Norton and Wendt India with their sales revenue from abrasives tabulated below.

Exhibit C-226: Major players in coated abrasives and their revenue from abrasive products

Company Name	Revenue (in Crore of INR)
Carborundum Universal (CUMI)	802.29
Grindwell Norton	653.90
Wendt India	661.31

Source: Capitaline, Annual reports

<sup>11</sup> Source: Industry report

### **Import export scenario**

The import export scenario for coated abrasives has been captured in Exhibit C-227 below.

Exhibit C-227: Import Export trends of coated abrasives

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5903, 6805</b>	59031090, 59039090, 68051010, 68051090	Rs. 47.77 Crore
<b>Exports</b>		
<b>5903, 6805</b>	59031090, 59039090, 68051010, 68051090	Rs. 8.56 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

### **Machinery details**

The backing cloth is made from polyester, rayon and cotton fibres. The fabrics are generally woven at 90 degrees to each other; another method of manufacturing backing cloth is stitching together an overlay of fibre placed 90 degrees to each other. The key machinery used for manufacture of backing cloth is rapier looms.

## **Ropes and cordages**

Synthetic ropes and cordages are substitutes to traditional ropes and cordages made from jute and cotton. The synthetic ropes and cordages are primarily made from polypropylene and polyethylene. The 3-Strand and 4-Strand ropes required for fisheries, electricity boards, defence, ports and shipbuilding yards, stevedoring companies, steel pipe industries, sugar factories, engineering and oil exploration. The company also makes 8-Strand ropes that are ideal for marine applications like mooring lines, towing lines, messenger lines and on-board oil rigs. These products are manufactured to desired specifications.

### ***Product Characteristics***

The ropes are generally available in 3-strand, 4-strand and 8-strand with standard lengths of length 110, 220, 330 and 440 metres and other customer specifications. The diameter of the ropes varies from ½ inch to 7 inches. The functional specifications of ropes are

- Excellent strength
- Controlled elongation
- Abrasion resistance
- Heat resistance

- Non-corrosive
- Light weight
- High flexibility
- Inert to chemicals

The ropes are made from polypropylene and HDPE polymer fibers.

### **Market size and trade trends**

#### ***Market size estimate***

The market size of ropes and cordages is estimated to be at Rs. 2327.14 Crore. The domestic consumption of ropes and cordages stands at Rs.1618.14 Crore and 161,813.80 MT growing at a CAGR of 19%.

Exhibit C-228: Market Sizing estimated of ropes and cordages

	2012-13
<b>Quantity of domestic consumption of ropes and cordage (in MT )</b>	161,813.80
<b>Value of domestic consumption of ropes and cordage (in Rs. Crore)</b>	1,618.14
<b>Exports of domestic consumption of ropes and cordage (in Rs. Crore)</b>	709.00
<b>Market sizing of domestic consumption of ropes and cordage (in Rs. Crore)</b>	2327.14

Source: Industry Survey, IMACS Analysis

#### ***Key growth drivers and Inhibitors***

Cordages industry is mainly driven by the infrastructure sectors growth and momentum.

#### ***Key Manufacturers***

Key manufacturers of synthetic ropes and cordages are:

- Garware Wall Ropes Ltd.
- Axiom cordages which is an export oriented unit
- Tufropes Pvt Ltd.

#### ***Import export scenario***

The import export trends in the cordages segment has been captured in Exhibit C-229 below.

Exhibit C-229: Import Export trends of ropes and cordages

Applicable HS code family	HS codes	(2012-13)

Imports		
<b>5607, 5608</b>	56074900, 56075040, 56079090, 56089090	Rs. 70.55 Crore
Exports		
<b>5607, 5608</b>	56074900, 56075040, 56079090, 56089090	Rs. 709.00 Crore

*\*source: IMAcS analysis, industry sources, DGFT, DGCIS*

### Machinery details

The key machinery employed in manufacture of synthetic ropes is given below:

- Extrusion
  - J P Industries
  - Lohia Starlinger
  - Kabra Machines
- Twisting and Winding
  - JMW, Coimbatore

## Composites (TT component)

Composites are produced by reinforcing a resin matrix (thermoplastic/thermoset) with fibres like glass fibre, aramid, carbon fibre and/or natural fibres. Unlike conventional materials like steel, aluminium etc. properties of the composite material can be designed for the required structural and functional aspects. Properties of composites like stiffness, thermal expansion etc. can be varied continuously over a broad range of values using appropriate fibre, resin and fabrication mechanism. The technical textile material in the composites is the fibre glass, aramid and carbon fibre.

### *Product Characteristics*

Composites are able to meet diverse design requirements despite being light-weight and have a high strength-to-weight ratio as compared to conventional materials. Some advantages of composite materials over conventional one are mentioned below

1. Tensile strength of composites is four to six times greater than that of conventional materials like steel, aluminium etc.
2. Improved torsion stiffness and impact properties
3. Higher fatigue endurance limit (up to 60% of the ultimate tensile strength)
4. 30-45% lighter than aluminium structures designed for the same functional requirements
5. Lower embedded energy
6. Composites are less noisy while in operation and provide lower vibration transmission

The key material of choice for composites is Glass fabric. Fibre glass dominates the composites industry as a preferred reinforcement fibre, with a share of around 85%-90%. Other reinforcement fibres like carbon fibre and aramid fibre are sparingly used in India owing to its patented technology and high costs.

Fibre glass is made of fine solid rods of glass each with thickness less than one twentieth the width of human hair. Glass fibres are loosely packed together into a mass which can serve as heat insulators. They are also used like wool or cotton fibres to make glass yarn, tape, cloth and mats. Fibre glass also has applications in electrical insulation, chemical filtration and fire fighter suits. Combined with plastics, fibreglass is used for airplane wings and bodies, automobile bodies, wind mill blades and boat hulls. In this section, we assume that the key contributor to the market of composites is Glass fabric.

### Market size and trade trends

The domestic consumption of glass fabric for composites is pegged at 114,000 MT and Rs. 1220.57 Crore. India exports 14342.48 MT of glass fabric worth of Rs. 201.78 Crore. This brings the total market size of glass fabric to Rs. 1422.35 Crore and 128342.50 MT.

Exhibit C-230: Market size estimate of glass fabric – composites

	2012-13
Quantity of domestic consumption of glass fabric (in MT )	114,000
Value of domestic consumption of glass fabric (in Rs. Crore)	1,220.57
Exports of glass fabric (in MT)	14,342.48
Exports of glass fabric (in Rs. Crore)	201.78
Market sizing of glass fabric (in MT)	128,342.50
Market sizing of glass fabric (in Rs. Crore)	2327.14

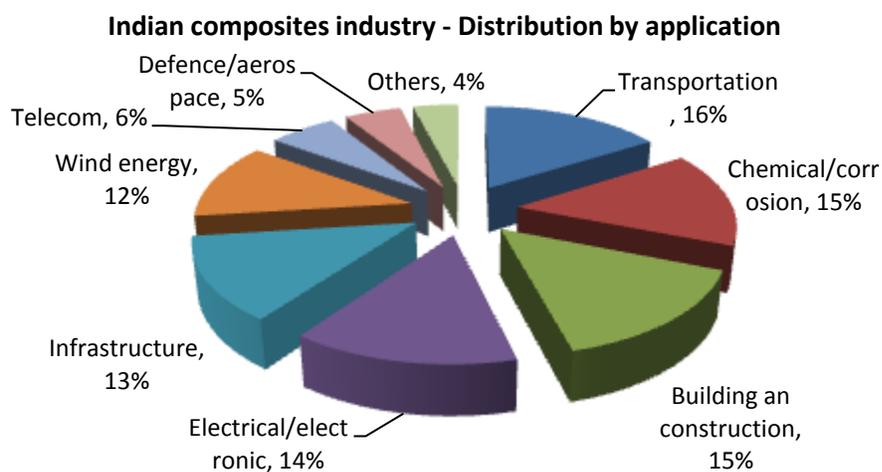
\*source: IMaCS analysis, industry sources, DGFT, DGCIS

### *Key growth drivers and Inhibitors*

The market for fibre glass is driven by the application industries such as:

- Transportation
- Building and Construction
- Chemical/Corrosion
- Infrastructure
- Wind energy
- Electrical and electronics

Exhibit C-231: Indian composites industry - distribution by application



\*source: FRP Institute

Growth across these segments would push the market size for composites.

### **Key Manufacturers**

Key manufacturers of composites in India include:

- Saertex India
- DSM Engineering Plastics
- Amiantit Fiberglass Industries India Private Limited
- Kemrock Industries
- Vestas RRB India Limited
- LM Glass Fibre

### **Import export scenario**

Most of import and export for composites occurs under the head of glass fabric and has been captured in Exhibit C-232: Export import trends for glass fabric Exhibit C-232.

Exhibit C-232: Export import trends for glass fabric

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>7019</b>	70191900, 70193200, 70199010, 70199090, 70195900, 70193100, 70191100, 70195100, 70195200	Rs. 498.56 Crore
<b>Exports</b>		
<b>7019</b>	70191900, 70193200, 70199010, 70199090, 70195900, 70193100, 70191100, 70195100, 70195200	Rs. 201.78 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIIS

## Printed Circuit Boards

The Printed Circuit Board (PCB) is a mechanical device used to electrically connect and hold electronic components. The technical textile used in the manufacture of printed circuit board is the woven glass fibre fabric which is used as reinforcement along with the epoxy resin. The glass fibre impregnated resin called 'prepregs' is used to bind the copper foils to give copper laminated boards, called laminates. These laminates are further cut into various sizes based on the requirement.

### *Product Characteristics*

The glass fabric used affects the performance of final electronic circuitry built on the PCB. The "fibre weave effect" or FWE is one of the central issues associated with the influence of the glass reinforcement fibre on the electrical performance of the PCB.

The glass fabric used for PCB is generally Style 1080 however there are various styles specified by IPC. The standard construction of this style of fabric involves 60 yarns per inch in the warp or machine direction and 47 yarns per inch in the weft or cross-machine direction. The thickness of the fabric is typically, 2.1mil (0.053mm).

The desired properties of the glass fabric required for PCB applications are as follows:

1. Dimensional stability
2. Surface smoothness
3. Ability to withstand laser and mechanical drilling
4. Superior conductive anodic filament (CAF) resistance
5. Uniform dielectric constant (generally in range of 6.6-6.9)
6. Lower dissipation factor (0.006)
7. Reduced signal skew and improved signal integrity

### Market size and trade trends

#### *Market size estimate*

The printed circuit board industry in India is yet to catch up with the rest of the World. India's share of production of the world PCB market is at a miniscule 0.3% - 0.5%. The PCB industry in India stands at a revenue of Rs. 57.12 Crore and thus, is still a nascent industry given the export import trends outlined in the following section.

The technical textile component of Printed circuit board industry in India is estimated to be about Rs. 28.89 Crore at 32.10 Million sqm. As per our interaction with industry association IPCA, a major chunk of this demand is catered to by imports. The technical textile component of printed circuit board comprises a very small fraction (0.2%) of its value.

Exhibit C-233: Market size of PCB - TT component

	2012-13
Market sizing of Technical textile component used in PCBs (in mn sqm)	32.10
Market sizing of Technical textile component used in PCBs (in Rs. Crore)	28.89

### **Key growth drivers and Inhibitors**

The key driver for technical textile used in PCBs is directly the printed circuit board consumption of India. This in turn is closely tied with the PCBs used in consumer durable equipments and electronic industry. So, we can expect the market to grow at a healthy rate, however whether the demand is taken up by imports or domestic production of technical textile remains to be seen.

### **Key Manufacturers**

Key manufacturer in the country for glass fibres to be used in PCB is AT &S Limited.

### **Import export scenario**

The export import trend of the printed circuit board industry is captured in Exhibit C-234 below.

Exhibit C-234: Import export trends of Printed Circuit Boards

Applicable family	HS code	HS codes	(2012-13)
<b>Imports</b>			
<b>8534</b>		85340000	Rs. 1,910.50 Crore
<b>Exports</b>			
<b>8534</b>		85340000	Rs. 706.51 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

### **Machinery details**

The raw material used for glass fibre fabric is monofilament glass fibres. The filaments are further processed to produce yarn which is used for weaving the reinforcement fabric.

The key machinery used for weaving glass fibre fabric is air-jet weaving machine the major producers of these air jet machines are as given below:

1. Sulzer Textil, Switzerland
2. SMIT SpA, Italy
3. Lindauer Dornier GmbH, Germany
4. Picanol, Belgium

### **Quality Standards**

The standards for manufacturing glass reinforcement fabric are set forth by IPC. The standard followed for manufacturing glass fibre fabric is IPC-4412.

## Filtration products

Filtration products are broadly classified based on the key application area. The broad classification based on applications is given below:-

- **Industrial filters** - Industrial filters include vacuum filters, pressure filters, and dust collection equipment like bag filters etc used in industries like Cement, Pharma, Fertilizer, Food Processing and other process industries
- **Automotive filters** - Automotive filters are primarily of three types - Oil filter, Air filter and Fuel filter. The filters clean the oil, air and fuel by blocking dirt and other unwanted particles from entering the vehicle system. The technical textile used in the filters is cellulose and polyester non-woven filter paper.

The filtration products can be classified into two major categories.

- Liquid solid separation
- Air-solid separation.

The filter media used for Air-solid separation is primarily non woven fabric whereas Liquid solid separation involves woven filter media.

Exhibit C-235: Filter media fabric properties

Woven Filter Media				
Fabric type	WEIGHT / SQ. MTR.	TENSILE STRENGTH (KGS.)		AIR PERMEABILITY (CU.FT/SEC)
		WARP	WEFT	
Polypropylene spun fabric	280 - 650	200 - 426	140 - 350	0.97 - 0.20
Polypropylene Multi filament fabric	275 - 450	295 - 500	145 - 400	0.5 - 0.13
Polyester spun fabric	360 - 670	325 - 600	250 - 308	0.20 - 0.109
Nylon filament fabric	330 - 450	310 - 548	275 - 414	0.60 - 0.23
Cotton fabric	400 - 830	135 - 320	110 - 225	0.30 - 0.08

The different properties of non woven filter media is captured as under:

Exhibit C-236: Non woven filter media properties

Non Woven Filter Media	Weight (GSM)	Thickness (Mm)	Breaking* Strength (Kgf)	Bursting Strength (Kg/Cm <sup>2</sup> )	Max. Temp. (C <sup>o</sup> )	Air Permeability**
Polyester & Polyester	300 – 550	1.7 - 2.3	30 - 70	15 - 30	150	160 - 750
Polypropylene & Polypropylene	400 – 700	1.8 - 3.0	70 - 150	30 - 40	90	100 - 200
Polyester - Acrylic & Polyester	500	202	70	30	120	200
Polyester - Viscose	220	1.8	16	4	130	550

### Product characteristics of automotive filters

The characteristics of the filter are based on the specification of the original equipment manufacturers: permeability, corrugation depth, bursting strength, pore size, volatile content, resin content and width and height. All the three filters are required for proper functioning of internal combustion engine. The technical textile used in the filters is polyester and cellulose non-woven fabric of around 120-150 GSM.

### Market size and trade trends

#### *Market size estimate*

The domestic consumption of automotive filters is estimated to be 8,481 MT and Rs. 170 Crore. Additionally, the filtration media consumption is estimated to be Rs. 124 Crore, putting the overall domestic consumption of filters at Rs. 294 Crore. Exports of filters stand at Rs. 2.29 Crore, pegging the market size of filters at Rs. 296.29 Crore.

Exhibit C-237: Market size estimate of filtration

	2012-13
Domestic consumption of automotive filters (in MT)	8,481
Value of domestic consumption of automotive filters (in Rs. Crore)	170.00
Value of domestic consumption of filter media (in Rs. Crore)	124.00
Exports of filter (in Rs Crore)	2.29
<b>Market size of filters (in Rs Crore)</b>	<b>296.29</b>

### **Key growth drivers and Inhibitors**

Taking into account that automotive filters constitute more than 50% of the filtration media market the primary growth driver for automobile filters is the automotive industry (including the replacement market). The key end users for industrial filters are Cement, Steel and Environmental filters related growth.

### **Key Manufacturers**

Key manufacturers of filtration media include:

- Khosla Profil Pvt. Ltd.
- Mahle-Purolator Filters
- Industrial filters Ltd.
- Supreme Industries Ltd.

### **Import export scenario**

The import export scenario for filtration is captured in below. Given the magnitude of the product segment, imports and exports own a small share of the market.

Exhibit C-238: Import export trends of filtration

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5603, 5911, 8421</b>	56031300, 56031400, 59111000, 59112000, 59113190, 59119090, 84219900	Rs. 6.48 Crore
<b>Exports</b>		
<b>5603, 5911, 8421</b>	56031300, 56031400, 59111000, 59112000, 59113190, 59119090, 84219900	Rs. 2.29 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

### **Key machinery used**

The machinery used for processing paper into filter paper is given below:

1. Filter paper impregnation machine

2. Pleating machine – Blade/Rotary type
3. Perforation machine
4. Curing machine

## Computer printer ribbon

The computer printer cartridge of a Dot matrix printer (DMP) consists of a cassette and inked fabric called the printer ribbon. The cartridge is replaced when no further prints can be availed, however in order to save on costs only the ribbon portion is changed which is called the refill.

### *Product Characteristics*

The Nylon 6 yarn is woven into a fabric which is cut to required size for making computer printer ribbons. The properties essential for this fabric is

1. High tensile strength
2. Good absorption capacity and capillary action
3. Smudge resistance
4. Scratch resistance
5. Good heat resistance

These properties enable the ribbon to carry the ink and undergo stress during printing. The fabric is prepared from nylon yarn. It is then cut into required dimensions, soaked in ink which is of the consistency of wax or crayon, and packed in rolls.

### Market size and trade trends

#### *Market size estimate*

The market size for computer printer ribbons is estimated to be at Rs. 286.24 Crore. The domestic consumption of printer ribbons is estimated to be 1,424.62 Million metres worth Rs. 284.92 Crore. The exports contribute a minor Rs. 1.32 Crore to the market size.

#### **Exhibit C-239: Market Sizing of printer ribbons**

	2012-13
Domestic consumption of computer printer ribbons (in Million metres)	1,424.62
Value of Domestic consumption of computer printer ribbons (in Rs. Crore)	284.92
<b>Value of export of computer printer ribbons (in Rs. Crore)</b>	1.32

	2012-13
<b>Market size of computer printer ribbons (in Rs. Crore)</b>	286.24

Source: Industry Survey, IMAcS Analysis

### ***Key growth drivers and Inhibitors***

The industry for computer printer ribbons is only further expected to decline because of rise and rapid adoption of laser and ink jet printers. Essentially, the sales of computer printer ribbons are driven by only institutional sales where the printers are expected to sustain very heavy frequencies of printing and life like railways and banks.

### ***Import export scenario***

The import export scenario for computer printer ribbons is outlined in the following Exhibit C-240. The imports constitute a bulk of the consumption.

Exhibit C-240: Import Export trends of computer printer ribbons

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5806, 9612</b>	58063110, 58063200, 96121010	Rs. 66.48 Crore
<b>Exports</b>		
<b>5806, 9612</b>	58063110, 58063200, 96121010	Rs. 1.32 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

## Paper making fabrics

Paper machine clothing consists of large continuous belts of custom designed and custom manufactured, engineered fabrics that are installed on paper machines and carry the paper stock through each stage of the paper production process – pulp created and pressed to a mesh, dewatered, heated, and dried by paper-making machines to make paper web. The types of fabrics are as follows:

- Forming fabric - single-layer and double layer fabrics, two-and-half layer designs.
- Press fabrics - comprising single-base and multi base fabrics.
- Dryer fabrics - which consist of woven mesh dryers fabrics, needled woven mesh dryers, spiral link dryer fabrics, and needled spiral link dryer fabrics.

The demand for these fabrics is primarily driven by paper mills. With the advent of technology synthetic material is being used to replace wire fabrics.

### ***Product Characteristics***

The paper making fabrics are made from polyester and polyamide wires which are woven to produce the fabric. Paper making fabric should have the following functionalities:

1. Dewatering ability or good drain ability
2. Transferability of wet paper web - transfer wet paper web safely to the next position by adhering the wet paper web to the felt.
3. Run-ability - avoid undesirable conditions as snaking, deviation, vibration and wrinkling.
4. Wear resistance and resistance to hair shedding
5. Compaction resistance
6. Paper surface smoothness - avoid any felt or roll markings.
7. Uniformity
8. Sustain high speeds of movement on paper making machine

These vary according to the grades of paper, types of paper-making machines and the positions where the felts are used. In short, each position of the paper-making machine requires different felts.

## Market size and trade trends

### *Market size estimate*

The market size of paper insulation felts is estimated to be Rs 213.96 Crore. Domestic consumption of paper making fabrics is estimated to be Rs. 210.08 Crore and exports add another Rs. 3.88 Crore to the market size.

Exhibit C-241: Market Sizing of paper making fabrics

	2012-13
Domestic consumption of paper making fabric Value (in Rs. Crore)	210.08
Exports of paper making fabric Value (in Rs. Crore)	3.88
<b>Market size of paper making fabric Value (in Rs. Crore)</b>	<b>213.96</b>

Source: Industry Survey, IMAcS Analysis

### *Key growth drivers and Inhibitors*

The key growth driver for this segment is the paper industry which is pegged to be growing at a rate greater than the GDP rate of the country.

### *Key Manufacturers*

Key manufacturers in the segment are:

- Voith paper fabrics Ltd.
- Wire and fabriks SA Ltd.

### *Import export scenario*

The import export scenario of paper making fabric felts is tabulated in Exhibit C-242.

Exhibit C-242: Import Export trends of paper making fabrics

Applicable HS code family	HS codes	(2012-13)
<b>Imports</b>		
<b>5911</b>	59111000, 59113190, 59113210, 59113250, 59113290, 59119010, 59119090	Rs. 67.33 Crore
<b>Exports</b>		
<b>5911</b>	59111000, 59113190, 59113210, 59113250, 59113290, 59119010, 59119090	Rs. 3.88 Crore

\*source: IMAcS analysis, industry sources, DGFT, DGCIS

**Machinery details**

The key machinery used for paper making fabrics is as given below:

- Warp penetration machines
- Weaving machine
- Finishing and head setting machine

## Industrial Brushes

Brushes are used for various surface finishing and surface cleaning applications both for Industrial and household purposes. Brushes used for Paint application constitute majority of the demand for Brushes. Other specific industrial applications include Textile finishing, Capsule polishing (Pharma industry), Cleaning of conveyor belts (Material handling industry), Bottle cleaning, etc.

### *Product Characteristics*

The important characteristics of brushes include:

- Bristle fill configuration-helical, spiral, straight filled and full-fill pattern
- Bristle density-high, medium and low
- Bristle material -natural hair (horse, pig hair etc.), nylon, polypropylene, steel etc.
- Shape-cylindrical, spiral, strip etc.

The paint brushes are characterised by standard length which varies from 25 mm to 125 mm. The length chosen by the painter depends on the kind of work. While the 25 mm brush is used to paint the interiors like furniture etc., the 125mm brush is used to paint the outer surface of house.

### Market size and trade trends

#### *Market size estimate*

The market size for industrial brushes is estimated to be at Rs. 188.43 Crore and 2423.82 MT growing from Rs. 117 Crore in 2007 -08 at a CAGR of 10%.

Exhibit C-243: Market size of industrial brushes

	2012-13
<b>Domestic consumption of industrial brushes (in MT)</b>	2423.82
<b>Market size of industrial brushes (in Rs. Crore)</b>	Rs. 188.43

Source: Industry Survey, IMaCS Analysis

#### *Key growth drivers and Inhibitors*

The key growth driver for this segment is the paint industry which is slated to grow 1.5 times the GDP growth. Since, brushes are driven by consumption of paints, we can expect a good growth in the segment accordingly.

***Key Manufacturers***

Key manufacturers in the segment are:

- Brushman India Ltd.
- Naraina Industries
- Hylite brushware
- Tic Tac Toes brushes

***Import export scenario***

The import and export numbers for industrial brushes are insignificant.

## 13. Non-Wovens

### Introduction

Nonwoven fabrics are broadly defined as sheet or web structures bonded together by entangling fibre or filaments (and by perforating films) mechanically, thermally or chemically. They are flat, porous sheets made directly from separate fibres or from molten plastic or plastic film. They are not made by weaving or knitting and do not require converting the fibres to yarn

Nonwovens are defined by ISO standard 9092 and CEN EN 29092. These two documents, identical in their content, are the only internationally acknowledged definition of Nonwovens. As industry, trade and technology have evolved since their publication in 1988, these standards are being updated by ISO experts to better reflect what the present understanding of Nonwovens is. The following text has recently been proposed to the International Standardization Organization by EDANA and INDIA.

Wet-laid webs are nonwovens provided they contain a minimum of 50% of man-made fibres or other fibres of non vegetable origin with a length to diameter ratio equals or superior to 300, or a minimum of 30% of man-made fibres with a length to diameter ratio equals or superior to 600, and a maximum apparent density of 0.40 g/cm. Nonwoven fabrics are engineered fabrics that may be a limited life, single-use fabric or a very durable fabric. Nonwoven fabrics have various functions such as stretch-ability, flame resistance, wash-ability, strength, absorbency, liquid repellence, resilience, softness, cushioning, filtering, bacterial barrier and sterility. These properties are often combined to create fabrics suited for specific jobs.

### Production process

The production of nonwovens takes place in three stages (Some stages may be overlapping or run simultaneously). The three stages are:

- Web Formation
- Web Bonding
- Finishing Treatments

### *Web Formation*

Nonwoven manufacture starts by the arrangement of fibres in a sheet or web. The fibres can be staple fibres packed in bales, or filaments extruded from molten polymer granules.

Four basic methods are used to form a web are:

- a. Dry-laid

- b. Spun-melt
- c. Wet-laid
- d. Other techniques

**a) Dry-laid**

There are two methods of dry-laying:

- Carding
- Air-laying

A carding machine is a rotating drum or series of drums covered in fine wires or teeth. Carding is a mechanical process starting with the opening of fibre bales which are blended and conveyed to the next stage by air transport. They are then combed into a web by a carding machine. The exact configuration of cards depends on the fabric weight and fibre properties needed. The web can be parallel-laid, or can be random-laid. Typical parallel-laid carded webs result in good tensile strength, low elongation and low tear strength in the machine direction and the reverse in the cross direction. Relative speeds and web composition can be varied to produce a wide range of fabrics with different properties.

In air-laying, usually short fibres are fed into an air stream. From there it goes on to a moving belt or perforated drum, where they form a randomly oriented web. Air laid webs offer great versatility in terms of the fibres and fibre blends that can be used. Compared with carded webs, air laid webs have lower density, greater softness and the laminar structure is absent.

**b) Spun melt**

Spun melt is a generic term describing the manufacturing of nonwoven webs directly from thermoplastic polymers.

It consists of two processes:

- Spun laid
- Melt blown

In spun laid process (also known as spun bonded) polymer granules are melted and then the molten polymer is extruded through spinnerets. Then the continuous filaments are cooled and deposited on to a conveyor to form a uniform web. In the spun laid process, the raw material flexibility is more restricted but it gives the nonwovens greater strength. Co-extrusion of second components is used in several spun-laid processes, usually to provide extra properties or bonding capabilities.

In melt blown web formation, on leaving the spinneret, low viscosity polymers are extruded into a high velocity airstream. This scatters the melt, solidifies it and breaks it up into a fibrous web.

**c) Wet-laid**

The method of wet-laying is similar to paper manufacturing but with synthetic fibres. Dilute slurry of water and fibres is deposited on a moving wire screen and drained to form a web. Then with the help of pressing between rollers the web is dewatered, consolidated and then dried. Impregnation with binders is often included in a later stage of the process.

#### **d) Other techniques**

This includes a group of specialised technologies, in which the fibre production, web structure and bonding usually occur at the same time and in the same place.

Flash spun webs are made by dissolving a polymer in a suitable solvent and then spraying it into a vessel which is held at reduced pressure. The solvent evaporates (flashes off) creating a cloud of fibres, which are collected and bonded. Other variants of web forming techniques include different methods of fibrillation such as electrostatic spinning.

Processes are emerging where two or more web forming techniques are used simultaneously. For example the spun-laid/melt blown process, in which one or more melt blown webs and spun laid webs are combined.

#### ***Web Bonding***

Webs, other than spun-laid, have little strength in their unbonded form. The web must therefore be consolidated in some way. The choice of method is a vital decision determining the ultimate functional properties.

There are three basic types of bonding:

- a. Chemical
- b. Thermal
- c. Mechanical

#### **a. Chemical bonding**

Chemical bonding or adhesion bonding mainly refers to the application of a liquid based bonding agent to the web. Three groups of materials are commonly used as binders:

- Acrylate polymers and copolymers
- Styrene-butadiene copolymers
- Vinyl acetate ethylene copolymers.

There are water based binder systems (most widely used), powdered adhesives, foam and in some cases organic solvent solutions, which are used.

The binder can be applied uniformly by impregnating, coating or spraying or intermittently, like print bonding. Print bonding is used when specific patterns are required and where it is necessary to have the majority of fibres free of binder for functional reasons.

**b. Thermal bonding (cohesion bonding)**

This method is based on the thermoplastic properties of certain synthetic fibres to form bonds under controlled heating. Here a low melt fibre or bi-component fibre is introduced at the web formation stage to perform the binding function later in the process but the web fibre itself can be used.

There are several thermal bonding systems in use:

- Calendaring welds the fibre webs together using heat and high pressure applied through rollers at speed.
- Through-air thermal bonding makes bulkier products by the overall bonding of a web containing low melting fibres. This takes place in a carefully controlled hot air stream.
- Drum and blanket systems apply pressure and heat to make products of average bulk.
- When the molecules of the fibres held under a patterned roller are excited by high frequency energy producing internal heating and softening of the fibres, sonic bonding takes place.

**c. Mechanical bonding**

In mechanical bonding the strengthening of the web is achieved by inter-fibre friction as a result of the physical entanglement of the fibres.

There are three major types of mechanical bonding:

- Needle-punching
- hydro-entanglement
- stitch-bonding

Needle-punching is most commonly used. Specially designed needles are pushed and pulled through the web to entangle the fibres. Webs of different characteristics can be needled together to produce a gradation of properties.

Hydro-entanglement uses high pressure jets of water to cause the fibres to interlace. It is mainly applied to carded or wet-laid webs. The water jet pressure used has a direct bearing on the strength of the web, but system design also plays a part. Hydro-entanglement is sometimes known as spun-lacing.

Stitch-bonding is a third type of mechanical bonding. It can be done with or without the addition of a thread. When no thread is added, the process is often referred to a loop formation.

### ***Finishing Treatments***

A variety of different chemical substances are employed before or after binding, or various mechanical processes are applied to the nonwoven after binding for modifying or adding to existing properties.

Nonwovens can be made flame retardant, water repellent, conductive, porous, antistatic, breathable, and absorbent and various other properties discussed before. They can also be coated, printed, dyed, and can be combined with other materials to form complex laminates.

Based upon the industry where it is used different methods are selected from above which will be applied. But mainly the following trends have been observed:

- Traditional textile industry uses Dry Form process
- The synthetic fibre industry uses the Spun-bond and Melt-blown methods
- The paper industry uses the wet process

### **Key Applications**

Non woven fabric manufacturers usually manufacture the fabric in a roll form. It is then sent to various other industries where it has end applications, where is it cut and given different form depending upon the use. Non-woven technical textiles have diverse applications across various segments of technical textiles like automotive, geo-textiles and health/hygienic sectors in various product categories like:

- Personal Care & Hygiene
- Healthcare
- Home Furnishings
- Leisure & Travel
- Clothing
- Automotive
- Construction
- Geo-textiles
- Industrial
- Agriculture and horticulture

### ***Personal Care Products***

Nonwovens due to their properties like softness, hygiene, ease of use and strength are ideal for personal care. Modern disposable absorbent hygiene products (AHPs) have become very popular in today's world. Similarly disposable personal hygiene wet wipes products are also gaining importance. Here, mostly needle-punched/thermal bonded or hydro-entangled nonwovens are used.

Main technologies used are Air-laid, Carded non-woven, Spun-melt Non woven of SMS and spun-bond.

### ***Household***

Nonwovens are used in a multitude of household applications ranging from cleaning and filtering to adding an aesthetic touch to the home. The most commonly used nonwoven products in home are the needle-punched carpets. Similarly thermal bonded nonwovens of PP find their application in the form of blinds. They prove to be cost effective over the woven ones. Another popular application is also the wall coverings used in various homes instead of the traditional wall paper. But these applications are not found much in India.

Spun-bonded nonwovens are used as backing fabrics in the furniture. Nonwoven also has various other furniture applications like up-holstered furniture. It is used in mattresses and quilts as well. Nonwoven wadding are also used in pillows.

Main technologies used are Needle punched, spun-bond and wet-laid non woven.

### ***Medical and Healthcare***

Nonwovens are extensively used in the medical field and in protection against biological agents in other sectors. New nonwoven materials with improved finishes including liquid repellent, virus proof and bacterial barrier properties have also been developed for applications such as surgical masks, gowns and drapes etc. For such applications, carded thermal bonds/ spun-bonds / hydro-entangled nonwoven fabrics are used.

Main technologies used are Dry-laid in particular hydro-entangled and melt blown and spun-bond technology.

### ***Clothing, footwear & baggage***

Nonwovens are being used for many decades in hidden, support functions, such as interlinings and components of shoes and bags. Nonwovens due to their versatility and the ability to engineer many different properties into them, such as shape-retention, adaptation to the characteristics of the out fabric and lightness in weight have become very popular for use in interlinings. India is a large exporter of garments hence there is huge application of nonwoven interlining found here. Another product is the polyester nonwoven wadding which is used in winter clothing materials. It is also used in protective clothing where there is high exposure to certain type of chemicals. In the footwear industry, the inner sole and inside linings of sports shoes are generally non-woven. It has various other applications as well like shoe uppers, stiffeners etc.

Main technologies used dry-laid non woven in particular thermo bonded, needle punched, hydro-entangled and chemically bonded and spun laid and melt blown.

### ***Automotive***

The use of nonwovens has increased substantially in recent years. Various automotive parts like carpets, insulations, headliners, door panels, parcel shelf, padding in seats, etc. are made from nonwoven fabrics. Nonwovens help reduce the weight of the car, enhance the comfort and aesthetics and provide advanced insulation, fire resistance, etc. In short they contribute to make cars safer, more comfortable, cost-effective and also attractive.

Due to their versatility and numerous benefits they are also widely used in the design and construction of other vehicles and transportation means like aeroplanes, trains, boats, spacecraft and satellites.

Main technologies used are Dry-laid - Needle punched, Spun-lace, Thermo-bonded and Spun-melt in particular spun bond.

### ***Geo-textiles***

Nonwovens are used for filtration, reinforcement and as separators in various civil engineering projects like roadways, railways, runways, drainage, bridges, canals, dams, reservoirs etc. Their main advantage is that they are very strong despite being very light in weight. Polyester felts are used to make bitumen composites for water-proofing in construction.

Rapid developments in infrastructure have led to huge demand for nonwovens in highway, railway, airport and landfill projects.

Technologies used Dry-laid and in particular Needle punched non woven and spun-laid non woven.

### ***Industrial***

Nonwoven products are used for various insulation and protective applications in the electronics industry. Polyester Nonwovens are used in cable wrapping. Another big application area of nonwovens is in the filtration area. Hi-loft wadding are used for fresh air filter systems. New products are also being developed whereby nonwovens are finding increasing applications in the packaging segment as well.

### ***Agriculture and horticulture***

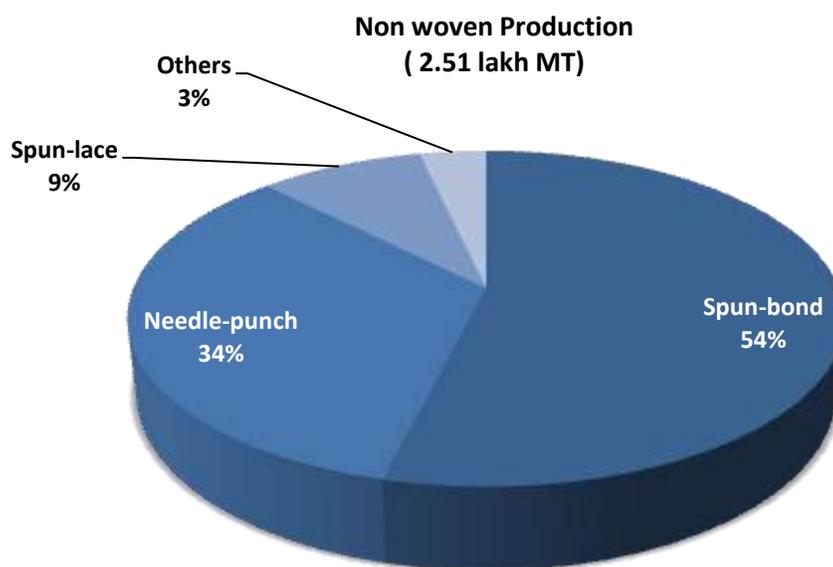
Nonwovens are used effectively for optimising the productivity of crops, gardens and greenhouses. The use of light weight spun-bond nonwoven crop covers on the land increases yields and improves the quality of the crops. It also helps to keep the growth of weeds under control. Usage of nonwoven mulch mat leads to healthy growth of flowers and vegetables.

Technologies used in agricultural applications are Needle punched and spun bon non woven.

### Market of Non-woven in India

The domestic production of non-woven in India is estimated to be around 2.51 lakh<sup>12</sup> MT for 2012-13. More than 50% of non-woven capacity in India is of Spun-bond non-woven followed by needle – punched non woven. The share of different types of non woven fabric manufactured in India is shown in the exhibit below.

Exhibit C-244: Types of non-woven produced in India



Source: ANFA statistics for nonwoven production in Asia 2012

The production of non-woven fabric in India is used across different segments to develop final finished products as well as exported in roll goods form. Many organisations in India are also involved in purchase of non-woven fabric and converting the same into end products. The market for non-woven fabric is dominated by the technical textile segment of Mobiltech, Meditech and Agrotech. The demand from automobile sector particularly for non-woven automobile interior carpets and filters is the biggest consumer of non woven fabric in India. It is followed by meditech products like sanitary napkins, diapers, surgical dressing, surgical disposables and absorbent fabrics. Other than these, usages in non woven wipes, shoe linings and insoles and interlinings is growing due to the cheaper cost of non-woven

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<sup>12</sup> Source: ANFA statistics for non-woven production in Asia 2012

fabric. In addition, non-woven is also used in several other products like cigarette filters, headliners, airlines disposables, surgical disposables, non-woven abrasives, mulch-mats, crop covers, etc.

### **Key Manufacturers**

Non –woven manufacturing in India has seen a major change in the last few years, with many players going for large capacity additions. The demand of both domestic market as well as growing export has been the major thrust behind the growth of the segment. While the market has grown, most of the production growth has been seen in the production of PP Spun-bond non woven, due to raw material advantage in procurement of poly propylene in India, in particular Gujarat. Key manufacturers of non-woven fabrics in India with their annual production statistics have been shown in the exhibit as under:

**Exhibit C-245: Key manufacturers of Non woven fabrics in India**

<b>Sl. No.</b>	<b>Company</b>	<b>Estimated Production ( in MTPA)</b>	<b>Type of non woven</b>
<b>1</b>	Supreme Nonwovens	12500	Spun-bond
<b>2</b>	Uniproducts India Ltd.	12150	Needle-punched
<b>3</b>	Ginni Filaments	10000	Spun-lace
<b>4</b>	Techfab India	8040	Stitch-bond
<b>5</b>	Alfa Foam	7800	Spun-bond
<b>6</b>	Mohak Carpets	6432	NW light weights
<b>7</b>	Well Spun	5000	Spun-lace
<b>8</b>	Surya Textech	4800	Spun-bond
<b>9</b>	Pratap Synthetics Ltd.	4500	Spun-bond
<b>10</b>	Pacific Harish	3600	Needle-punched
<b>11</b>	Fiberweb	3600	Spun-bond
<b>12</b>	PARK Nonwoven	2100	Needle-punched
<b>13</b>	Dharmesh textiles	720	Needle-punched
<b>14</b>	Hitkari Fibers Ltd.	480	NW light weights
<b>15</b>	Rizwan Carpets	432	NW light weights
<b>16</b>	Charminar Nonwovens	144	Spun-bond
<b>17</b>	Parishudh Fibers	108	Needle-punched

*\*Source: Primary survey, Annual reports, websites, secondary reports, ITTA*

***Growth drivers and Inhibitors***

The key advantage is of cheap and easy availability of raw material in particular Poly Propylene (PP), which is used in most of the spun-bond non woven manufactured in India. This has been a boon for India giving organisations the strategic advantage for expanding their operations in India. Along with this, the wide range of applications for Non-woven in different sectors from rolled goods form to raw materials to intermediate products to end products, helped in diversifying the risks associated with the market in the last few years when both India and the world was facing a recessionary trend and the markets were growing very slowly. In addition to that growth in new product markets in India like that of Non woven wipes, medical textiles, geo-textiles and increased usage in Agro textiles paved the way for a healthy growth of non woven industry in India.

## 14. Speciality Yarn

Speciality yarn is developed through special chemical coating of a general yarn or specialised fibre. These are used for highly specified industrial use and in fire and armour protective clothing. These are of the following types –

### Glass fibre

Glass Fibre as reinforcement dominates the sector of composites material with a share of 85-90%. The formulation chosen for continuous fibre glass production is generally known as E-glass. Glass fibre finds application in a variety of products in Technical Textiles.

The fibre is produced in India though the Indian manufactures are facing threat from cheap Chinese imports. The key producers of Glass Fibre in India are:

- Owens Corning (India) Ltd.
- Goa Glass Fibre Ltd., a wholly owned subsidiary of Binani Industries Ltd.
- UP TWIGA Fibre Glass Ltd.
- FGP Ltd
- Deccan Fibre Glass Ltd
- Glass Fibre Division, CEAT Tyres Ltd

Owens Corning (India) Ltd. (OCIL) is the largest fiberglass manufacturer in India. The company has a state-of-art glass-fiber manufacturing facility at Taloja, near Mumbai. OCIL manufactures three main lines of products - chopped strand mat, roving (a slightly twisted strand of fibers) and T-30, used in the composites industry. OCIL has acquired the manufacturing facilities of Saint Gobain Vetrotex India Ltd. that manufactures E-glass reinforcements for thermoplastics and thermo-sets along with full range of E-glass textile yarns and Cem-Fil (Cement reinforcement) fabrics (both woven and knitted with or without coating).

Glass fibre is also used in the form of sewing thread for various industrial uses. The fibreglass yarn is encapsulated by chemical PTFE to provide it high resistance to acids and alkali, increase flexibility of the fibreglass yarn and increase heat resistance. These can withstand temperatures of up to 538 degree Celsius.

### **Application –**

These find applications in polymer and ceramic matrices and thermal shields used in aerospace applications as well as in industrial applications like furnace linings, gaskets, door seals and tube seals and industrial insulating products. It can also be used in industrial protective clothing.

### **Aramid**

Aramid has the largest share amongst the specialty fibres. These are aromatic polyamides available in different grades with properties to suit various applications. The typical properties of Aramid fibre are low density, high strength, good impact resistance, good abrasion resistance, good chemical resistance, good resistance to thermal degradation and compressive strength similar to E-glass fibres. Aramid fibre has both textile and non textile applications; the key applications of Aramid fibre in technical textiles include:

- Ballistic protective applications such as bullet proof vests
- Protective apparel such as gloves, motorcycle protective clothing and hunting gaiters, chaps and pants.
- Sails for sailboats, yachts etc
- Belts and hosing for industrial and automotive applications
- As a protective layer in industrial gloves to provide cut/ slash protection.
- In production of inherent FR fibres and fabrics

The demand for aramid fibre is met by imports. USA and Germany account for majority of imports of Aramid to India followed by China.

Du Pont is the leading manufacturer of Aramid fibres. The company markets its product under the brand name Du Pont Kevlar. Another brand gaining recognition in the Indian market is Spectra developed by Honeywell. Aramid is also used to develop high strength threads and yarn used for stitching of aramid fabric. These are schappe-spun aramide sewing threads used for stitching of Kevlar. It has very high strength. It does not melt or support combustion and hence is often used in flame resistant clothing. The tex specification range from 42 to 84 with the breaking strength from 4.8 kg to 10.4 kg.

### **Carbon fibre**

Carbon fibre is second largest segment among the specialty fibres after aramid. The fibre finds application in Protech segment of Technical textiles. The bulk of demand for the material in India is met through imports from Japan and France. Lately many Indian companies through tie ups have started to manufacture composites using carbon fibre for technical textile industry particularly automotive and indutech sectors. The area is also seeing growth in investment during the last three years and is expected to become a significant part of Indian technical textile industry.

Globally, Toray Industries Inc. is the world's largest producer of carbon fibre. Other manufacturers of Carbon fibre are Toho Tenax (Japan), Mitsubishi Rayon (Japan), Zoltek (USA) and Hexcelcorp. (USA).

The first manufacturing facility for carbon fibre in India was set up by The National Aerospace Laboratories (NAL) in Bangalore at an investment of about Rs 30 crore. The plant has a capacity of 20 MT/annum.

Carbon fibre is also used to prepare carbon fibre sewing thread. Carbon fibre sewing threads are made of more than thousand carbon fibres of thickness 5 to 8 microns bundled together. It has very high tensile strength and temperature resistivity of up to 1100 degree Celsius. These have tex specifications from 200 to 1200 and a strength ranging from 3450 Mpa to 4000 Mpa.

#### **Application**

It finds application in extreme automotive industries like sports cars and super bike manufacturing and for aerospace and marine applications.

#### **Others**

Other than the above mentioned major speciality fibres, many specialised industrial threads are used. These are as discussed below:

#### ***Alumina Silica Speciality yarn***

These are made of thousands of metal filaments and are has flexibility of textile with the chemical and heat resistance of the metal. It has good insulation properties. It can withstand thermal shocks up to 1200 degree Celsius.

#### **Application**

It finds usage in thermal insulation pads, insulation jackets, safety spray shields, braided sleeving, kiln seals, welding blankets and high temperature textiles.

#### ***Stainless steel spun yarn with cotton or PTFE***

These are stainless steel threads having high heat resistance of up to 800 degree Celsius and often sheathed in PTFE or cotton.

#### **Application**

It is mostly used in high temperature operating scenarios with temperature above 550 degree Celsius like heat shield curtains and high temperature textiles.

## **Part D. Technical Textile Industry Analysis**

## **Factor Availability**

India has become a major player in the world market for technical textiles and the domestic production of technical textiles in particular non-woven is increasing at an encouraging rate of over 13%. World over the growth of Non-woven industry in India is amongst the world's top five with China leading the industry. This has become possible due to a number of suitable economic environmental factors and easy availability of key factors governing the technical textile industry like supply of raw materials, easy availability of acceptable standard of technology, work force and cheap labour, Infrastructural aspects like power, testing facilities and transport network. In addition to this, a policy and regulatory framework which has been very supportive for new investments, expansion and up-gradation of technical textile units has been a major support for development of technical textile industry in India. These factors have been discussed in details in the subsequent sections.

## 1. Raw Material Availability

Key Raw material required for technical textile industry is mostly fibre. India is one of the leading producers of both natural and man-made fibres in the world. Easy availability of fibres at a cheaper rate has been a major factor behind the success of Indian textile as well as technical textile industry. The major fibres used in technical textile industry have been discussed as under.

### Natural fibres

Natural fibres used in technical textile industry –

- Cotton
- Jute
- Silk
- Coir

### *Cotton*

Cotton is the most important natural fibre being used in India. At 6 million MT of production of cotton fibre, cotton accounted for 82% of fibre production in India at over 54% of entire yarn production in India for 2011-12.

India is world's second largest producer of cotton after China with a production of 28.5 million bales of cotton accounting for 23% of world's production. India has a total of 11.7 million hectares under cotton cultivation growing at 4% per annum. Gujarat, Andhra Pradesh and Maharashtra are the leading producers of Cotton in India. Cotton balance sheet of India is as shown in the exhibit below:

Exhibit D-1: Cotton balance sheet for last five years

Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	6	12	7	8	5
<b>Supply Side</b>					
Domestic production	49	52	58	60	57
Imports	2	1	0	2	2
<b>Total Availability</b>	<b>57</b>	<b>65</b>	<b>65</b>	<b>70</b>	<b>64</b>
<b>Demand side</b>					
Mill consumption	32	37	38	37	39
Non Mill consumption	3	3	2	2	3
Small spinners consumption	3	4	4	4	3
Total Domestic Consumption	39	44	44	43	46
Exports	6	14	13	22	12
<b>Total utilization</b>	<b>45</b>	<b>58</b>	<b>57</b>	<b>65</b>	<b>58</b>

*Interim report on Baseline Survey of Technical Textiles in India 2013*

Description	2008-09	2009-10	2010-11	2011-12	2012-13
Closing stock	12	7	8	5	6

Source: Cotton Advisory board

All figures are in lakh MT

### **Jute**

Jute is a key raw material for making of sacking used in Pack-tech and geo-tech. India is the second largest producer of raw jute after Bangladesh producing 2,053 MT of raw jute in 2012-13 with a total area of 8.27 lakh hectares under Jute cultivation. West Bengal , Bihar and Assam are the leading states producing Jute in India. Jute production India has been growing at 2.4% per annum mainly due to increasing productivity with the area under jute cultivation declining at 2.1% for the last five years. More than 80% of the jute produced in India is used for making of sackings, CBC and other technical textile products. Jute balance sheet for India is shown in the exhibit below:

**Exhibit D-2: Jute Balance sheet**

Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	4	1	2	4	6
<b>Supply Side</b>					
Domestic production of Jute goods	15	16	18	18	17
Imports	0	1	1	2	1
<b>Total Availability</b>	<b>19</b>	<b>18</b>	<b>22</b>	<b>24</b>	<b>24</b>
<b>Demand side</b>					
Mill consumption	16	14	16	17	17
Domestic Consumption	2	2	2	2	2
Total Domestic Demand	18	16	17	18	19
Exports	0	0	0	0	0
<b>Total utilization</b>	<b>18</b>	<b>16</b>	<b>17</b>	<b>19</b>	<b>19</b>
Closing stock	1	2	4	6	5

Source: Jute Commission of India

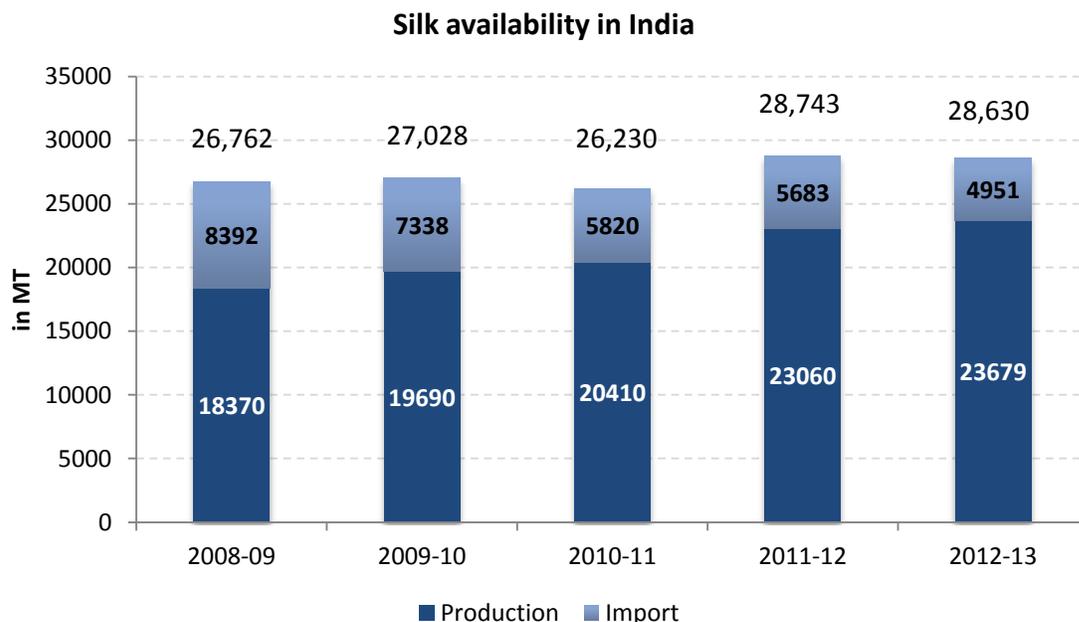
All figures are in lakh MT

### **Silk**

Silk is used to manufacture some varieties of blinds (Homotech), sutures (Meditech) and sewing threads (Clothtech), though the consumption is limited to high end products.

India is the second largest producer of silk producing 23,690 MT of silk in 2011-12, contributing to 15% of the world production followed by China which accounts for 82% of silk production all over the world. Indian silk production has been growing at 6.5% per annum. The major silk producing centres of India are Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal and Assam. However, the production of silk is not sufficient to cater to the National demand and India is a major importer silk from China. The availability of raw Silk in India has been shown in the exhibit below:

Exhibit D-3: Silk production in India



Source: Report on Silk industry & CSB-Dec 2013 at MoT

### Coir

Coir, the coconut fibre finds application in mattresses, ropes, cordages and floor coverings. India is world's largest producer of coir fibre accounting for over 60% of world production. Sri Lanka is the other major coir producer. Together India and Sri Lanka account for more than 90% of coir production across the world. Indian Coir fibre production is estimated to be 6.10 lakh MT in 2012-13. India is the major exporter of coir exporting to 98 countries. The coir industry in India is concentrated in coconut growing States – Kerala and Tamil Nadu, which together account for 90% of Indian coir production.

### Man-made fibres

Manmade fibres (MMF) and Man Made filament yarns (MMFY) account for around 40% share of the total fibre consumption in the textile industry as a whole. These fibres form a key raw material for the technical textile industry especially because of their tailor made properties. The key manmade fibres/filaments and polymers used as raw material in Technical Textile industry are:

- Manmade fibres/filaments
  - Viscose
  - Polyester

- Nylon
- Acrylic/Mod-acrylic
- Polypropylene
- Polymers
  - HDPE
  - LLDPE
  - LDPE
  - PVC

The segment wise consumption of various man-made fibres/filaments and polymers is given below:

Natural Fibre	Key segments
<b>Viscose</b>	Clothtech, Homotech, Mobiltech*
<b>Polyester</b>	Buildtech, Geotech, Clothtech, Packtech, Meditech, Agrotech, Sportech, Homotech, Indutech
<b>Nylon</b>	Buildtech, Clothtech, Packtech, Mobiltech, Meditech, Agrotech, Sportech, Indutech
<b>Acrylic/Mod-acrylic</b>	Buildtech, Protech, Meditech, Homotech
<b>Polypropylene</b>	Buildtech, Geotech, Clothtech, Packtech, Mobiltech, Meditech, Agrotech, Sportech, Homotech, Indutech
<b>HDPE</b>	Buildtech, Oekotech, Packtech, Sportech, Indutech
<b>LDPE/LLDPE</b>	Packtech, Agrotech, Sportech,

*\*Viscose High Tenacity filament yarn finds application in Mobiltech*

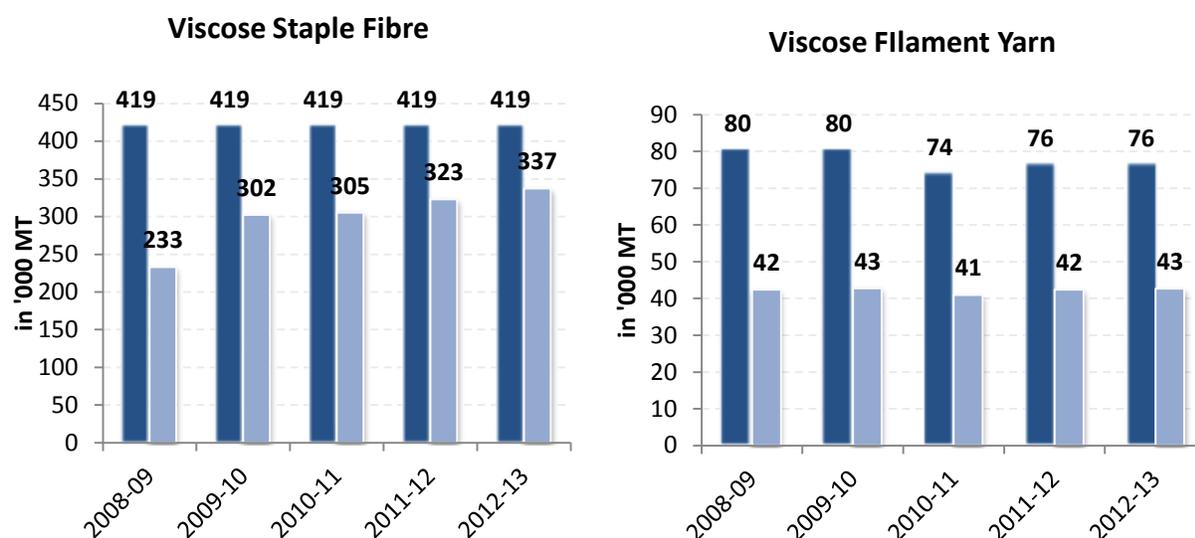
India is a major producer of man-made fibres and filament yarns across the world. A major chunk of this production is clustered in Gujarat. India produced 1,234 million kg of man-made fibres and 1,416 million kg of man-made filament yarn in 2011-12. Details of major man-made fibres and filament yarn used in technical textile industry have been discussed in the subsequent sections.

### ***Viscose Fibre/Filament***

Viscose is an important raw material for Clothtech. Viscose also finds application in manufacturing of wipes (Homotech) because of high absorbent properties. A special variety of viscose i.e. Viscose High Tenacity Filament yarn called tyre yarn finds application in Mobiltech. The industry has not seen any

capacity addition in the last five years. However, production of VSF has been growing at 10% y-o-y during the last five years as compared to Viscose filament yarn which has remained stagnant over the period. Currently India has sufficient capacity for both VSF and VFY operating at 80% and 56% of the installed capacity respectively. The exhibit below gives details of capacity and production of VSF and VFY in India.

Exhibit D-4: Production of VSF



Source: CITI annual report 2012-13

Majority of Viscose produced in India is consumed domestically. The details of production, import, export and consumption of Viscose fibre and filament can be seen in the exhibit below:

Exhibit D-5: Viscose balance sheet of India

Description	2008-09	2009-10	2010-11	2011-12	2012-13
<b>VISCOSE STAPLE FIBRE</b>					
Opening Stock	14	8	2	2	21
<b>Supply Side</b>					
Domestic Production	233	302	305	323	337
Imports	11	19	14	21	15
<b>Total Availability</b>	<b>258</b>	<b>329</b>	<b>321</b>	<b>346</b>	<b>374</b>
<b>Demand side</b>					
Domestic Consumption	221	268	263	246	249
Exports	28	59	56	79	100
<b>Total utilization</b>	<b>250</b>	<b>327</b>	<b>319</b>	<b>324</b>	<b>349</b>
Closing stock	8	2	2	21	25
<b>VISCOSE FILAMENT YARN</b>					

Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	3	2	2	2	3
<b>Supply Side</b>					
Domestic Production	42	43	41	42	43
Imports	5	12	13	11	9
<b>Total Availability</b>	<b>50</b>	<b>56</b>	<b>56</b>	<b>55</b>	<b>55</b>
<b>Demand side</b>					
Domestic Consumption	45	49	49	45	46
Exports	4	5	6	6	7
<b>Total utilization</b>	<b>49</b>	<b>54</b>	<b>55</b>	<b>52</b>	<b>53</b>
Closing stock	2	2	1	3	2

Source: CITI annual report 2012-13

India consumes majority of the indigenously manufactured viscose. Significant reduction in imports over the years indicates that India is self sufficient with regards both viscose staple fibre/filament.

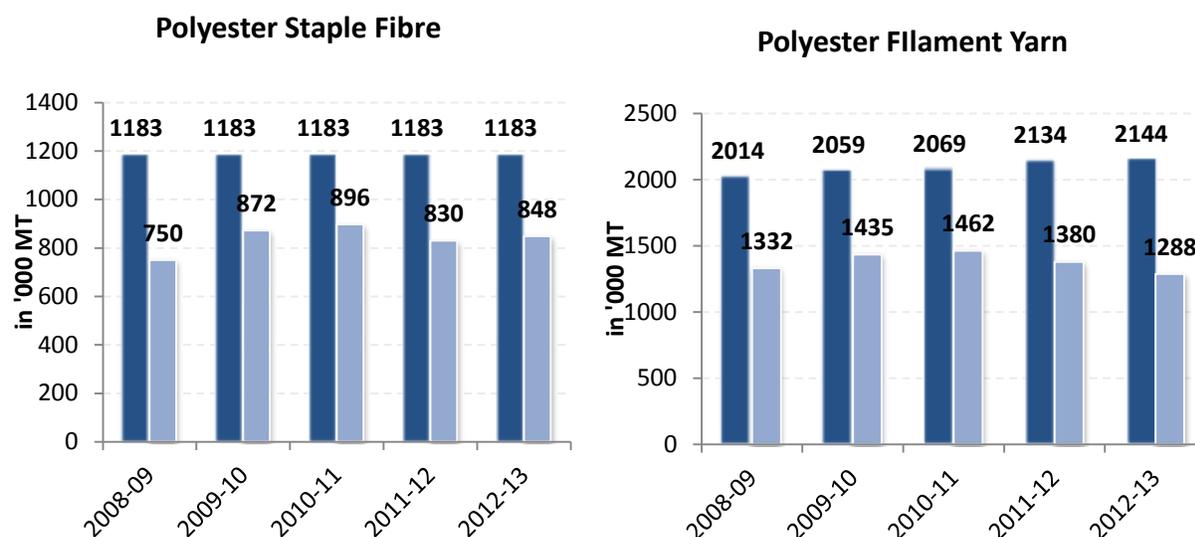
Grasim Industries is the major manufacturer of regular viscose staple fibre whereas Century Rayon and Indian Rayon and Industries Ltd. are the major manufacturers of viscose filament yarn.

### **Polyester**

Polyester (Polyethylene Terephthalate or PET) is the one of the most widely used synthetic fibre in technical textiles. The fibre has variety of applications however, around 40-50% of the polyester produced is used for textile application. Some of the unique features of polyester, making it more desirable in the textile industry, are shrinkage resistance, wrinkle resistance, mildew and abrasion resistance, etc. Polyester is used as a raw material either in form of Polyester Staple fibre (PSF) or Polyester Filament yarn (PFY).

Polyester accounts for 81% of manmade fibre and filament produced in India. While capacity of PSF has remained stagnant in India for the last five years, PFY has seen regular capacity addition with capacity growing at 3% y-o-y. Production trend however paint a different picture with PSF production growing at 6% while that of PFY declining at 2% y-o-y. Currently India has enough capacity for both PSF and PFY. The details of capacity and production can be seen in the exhibit below.

Exhibit D-6: Production of PSF and PFY



Source: CITI annual report 2012-13

Majority of polyester consumed in India is indigenously produced. Polyester is also imported though the imports have reduced over the years with increasing domestic production and India is a net exporter of Polyester staple fibre/filament. The details of production and consumption of polyester in India can be seen in the exhibit below:

Exhibit D-7: Balance sheet for polyester in India

Description	2008-09	2009-10	2010-11	2011-12	2012-13
<b>POLYESTER STAPLE FIBRE</b>					
Opening Stock	33	9	9	18	12
<b>Supply Side</b>					
Domestic Production	750	872	896	830	848
Imports	17	14	32	45	31
<b>Total Availability</b>	<b>799</b>	<b>896</b>	<b>937</b>	<b>892</b>	<b>891</b>
<b>Demand side</b>					
Domestic Consumption	654	726	756	704	711
Exports	136	161	162	176	158
<b>Total utilization</b>	<b>790</b>	<b>887</b>	<b>919</b>	<b>880</b>	<b>869</b>
Closing stock	9	9	18	12	22
<b>POLYESTER FILAMENT YARN</b>					
Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	45	23	28	43	44
<b>Supply Side</b>					
Domestic Production	1332	1435	1462	1380	1288

Description	2008-09	2009-10	2010-11	2011-12	2012-13
Imports	70	29	19	24	32
<b>Total Availability</b>	<b>1447</b>	<b>1487</b>	<b>1510</b>	<b>1447</b>	<b>1363</b>
Demand side					
Domestic Consumption	1342	1327	1221	1106	942
Exports	82	132	246	297	386
<b>Total utilization</b>	<b>1424</b>	<b>1459</b>	<b>1467</b>	<b>1403</b>	<b>1328</b>
Closing stock	23	28	43	44	35

Source: CITI annual report 2012-13

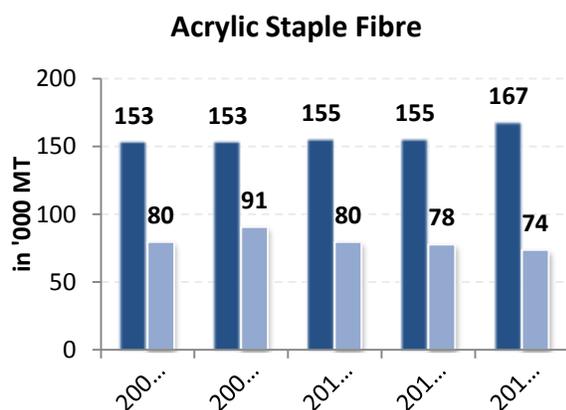
Reliance is the country's largest manufacturer of polyester and related products. The other major manufacturers of polyester are Century Enka, Indo Rama Synthetics, JBF Industries, JCT Fabrics and Sanghi

### Acrylic / Mod-acrylic fibres

Acrylic fibres are defined as those which contain not less than 85% of acrylonitrile molecule. Fibres which contain 35-85% acrylonitrile molecule are "mod-acrylic" fibres. In addition there are many types of modified acrylic fibres such as animal-like fibres with oval cross-section, thermal resistant fibres, anti-pilling fibres, antibacterial and deodorant fibres, and anti-static fibres. Acrylic fibres are majorly used for manufacturing Blinds and Stuff toys (Hometech). Mod-acrylic fibres find application in manufacturing flame retardant apparel (Protech).

The details about capacity and production can be seen as under:

Exhibit D-8: Production of ASF



Source: CITI annual report 2012-13

The consumption of acrylic fibre and its production as well as trade trends can be seen as follows:

Exhibit D-9: Balance sheet for acrylic fibre in India

ACRYLIC STAPLE FIBRE					
Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	3	3	2	8	4
Supply Side					
Domestic Production	80	91	80	78	74
Imports	11	11	21	20	26
<b>Total Availability</b>	<b>93</b>	<b>104</b>	<b>103</b>	<b>105</b>	<b>104</b>
Demand side					
Domestic Consumption	89	96	70	86	94
Exports	2	6	25	15	6
<b>Total utilization</b>	<b>90</b>	<b>102</b>	<b>95</b>	<b>101</b>	<b>100</b>
Closing stock	3	2	8	4	4

Source: CITI annual report 2012-13

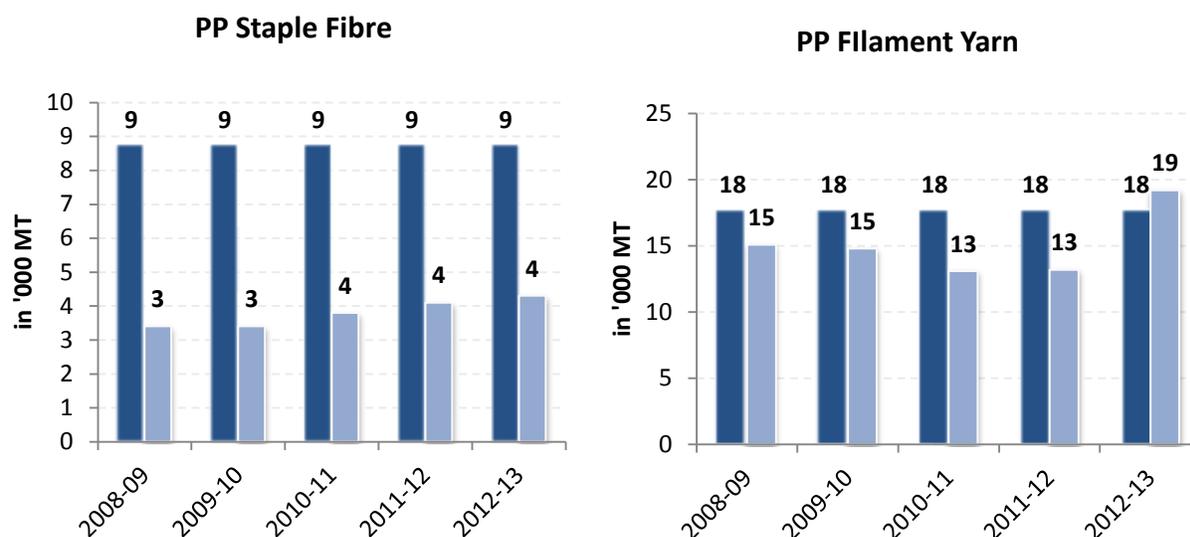
The major manufacturers of Acrylic and mod-acrylic fibres in India are India Acrylics Ltd, Pashupati acrylon Ltd. and India Petrochemical Corporation (Reliance).

### ***Polypropylene***

Polypropylene is the most widely used raw material for the technical textile products because of its special properties. The production and consumption of polypropylene staple fibre has remained stable for the last 3 years. The domestic demand is met by indigenous production.

The demand for Polypropylene filament yarn is partly met by imports though the imports are decreasing over the years. The details of capacity and production of polypropylene in India is as shown:

Exhibit D-10: Production of PPSF & PPFY



Source: CITI annual report 2012-13

The details of the PP fibre export, import and consumption has been shown in the exhibit below:

Exhibit D-11: Balance sheet of PP fibre and yarn

Description	2008-09	2009-10	2010-11	2011-12	2012-13
<b>POLYPROPYLENE STAPLE FIBRE</b>					
Opening Stock	0.0	0.1	0.0	0.1	0.0
<b>Supply Side</b>					
Domestic Production	3.4	3.4	3.8	4.1	4.3
Imports	0.1	0.2	0.1	0.3	0.3
<b>Total Availability</b>	<b>3.5</b>	<b>3.7</b>	<b>3.9</b>	<b>4.5</b>	<b>4.6</b>
<b>Demand side</b>					
Domestic Consumption	2.6	3.1	3.3	3.9	3.2
Exports	0.9	0.5	0.6	0.6	1.4
<b>Total utilization</b>	<b>3.5</b>	<b>3.6</b>	<b>3.9</b>	<b>4.5</b>	<b>4.6</b>
Closing stock	0.0	0.1	0.0	0.0	0.0
<b>POLYPROPYLENE FILAMENT YARN</b>					
Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	0.3	0.1	2.2	0.2	0.3
<b>Supply Side</b>					
Domestic Production	15.1	14.8	13.1	13.2	19.2
Imports	1.7	1.2	1.5	1.9	1.5
<b>Total Availability</b>	<b>17.1</b>	<b>16.1</b>	<b>16.8</b>	<b>15.3</b>	<b>21.0</b>
<b>Demand side</b>					
Domestic Consumption	16.4	13.1	15.5	13.8	18.7

Description	2008-09	2009-10	2010-11	2011-12	2012-13
Exports	0.6	0.8	1.3	1.2	1.9
<b>Total utilization</b>	<b>17.0</b>	<b>13.9</b>	<b>16.8</b>	<b>15.0</b>	<b>20.6</b>
Closing stock	0.1	2.2	0.0	0.3	0.4

Source: CITI annual report 2012-13

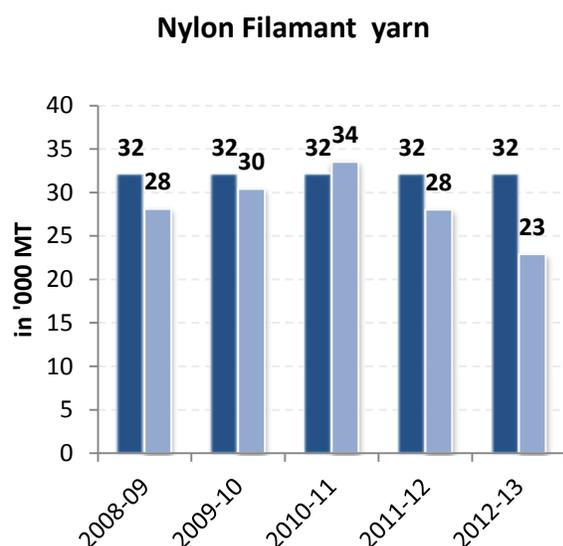
Key manufacturers of PP fibre and filament are Jindal Polyester Ltd., Reliance Ltd and Parasrampur Industries.

### Nylon

Nylon (Polyamide) finds application in majority of the technical textile products. Regular Nylon filament yarn is produced in India though the consumption has outpaced the indigenous production in recent years resulting in increase in imports.

Nylon tyre yarn is a key input for the Mobiltech technical textiles. The production of nylon has been declining over the last few years on account of declining demand of indigenous consumption. The details of production and capacity for Nylon filament yarn is as shown:

Exhibit D-12: Production of Nylon Filament yarn



Source: CITI annual report 2012-13

The details of consumption and trade trends for Nylon filament yarn is as shown:

Exhibit D-13: Balance sheet for nylon

NYLON FILAMENT YARN					
Description	2008-09	2009-10	2010-11	2011-12	2012-13
Opening Stock	3	2	3	6	2
Supply Side					
Domestic Production	28	30	34	28	23

NYLON FILAMENT YARN					
Description	2008-09	2009-10	2010-11	2011-12	2012-13
Imports	4	2	2	1	2
<b>Total Availability</b>	<b>35</b>	<b>34</b>	<b>39</b>	<b>36</b>	<b>27</b>
Demand side					
Domestic Consumption	31	29	30	32	23
Exports	2	2	2	2	2
<b>Total utilization</b>	<b>33</b>	<b>31</b>	<b>32</b>	<b>34</b>	<b>25</b>
Closing stock	2	3	6	2	2

Source: CITI annual report 2012-13

Century Enka and SRF Ltd. and are the key manufacturers of Nylon yarn

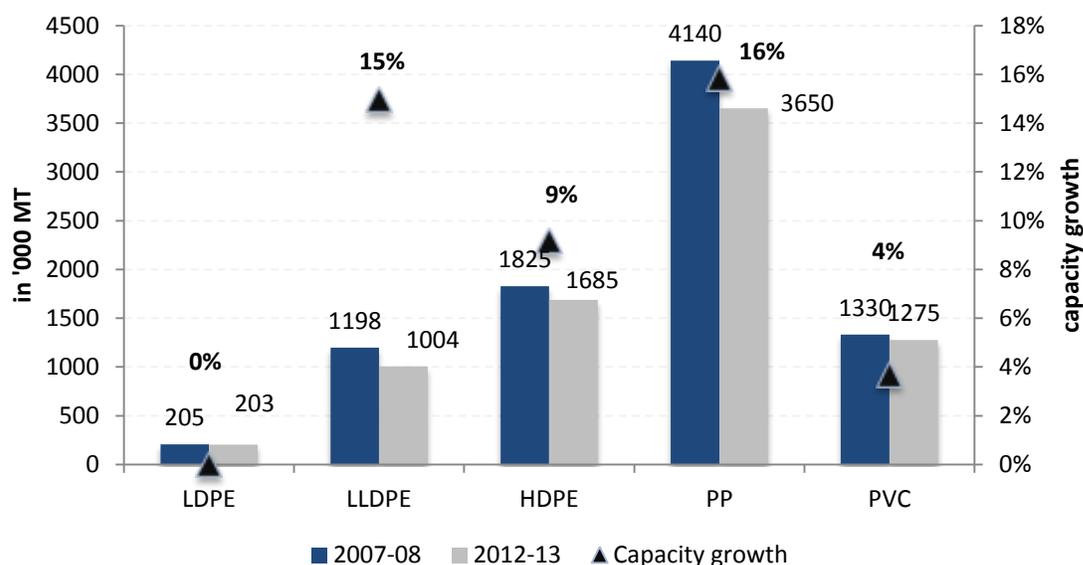
### Polymers

Polyethylene (PE) is the most widely used polymer. It has three different varieties depending on the density - High Density Polyethylene (HDPE), Low Density Polyethylene (LDPE) and Linear Low Density Polyethylene (LLDPE). Different types of PE and Poly Vinyl Chloride (PVC) are the key polymers that find application in technical textile. HDPE/LDPE tapes are used in manufacture of variety of technical textile products. In addition the polymers are used as coating material for interlinings, etc. HDPE has a significant consumption in the packaging industry and variety of other products in technical textiles.

PVC is majorly used as coating material for flex fabric, blinds, etc. The consumption of PVC in last five years has increased outpacing the production. With significant increase in imports of PVC India is a net importer of PVC.

During the XIth five year plan capacity of LLDPE and HDPE increased by 15% and 9% respectively making India a net exporter in both the categories. India is also a major exporter of PP and industry saw capacity additions at 16% per annum for PP during the last five years. The details of capacity and production of major polymers used in Technical textile are shown in exhibit below.

Exhibit D-14: Capacity and Production of polymers 2011-12



Source: CPMA website, WG report on Petrochemical industry 2012

The production consumption and trade of key polymers for 2011-12 is as shown in the exhibit below

Exhibit D-15: Key statistics for polymers used in Technical textiles

2011-12 (in '000 MT)	Capacity	Production	Demand	Import	Export
LDPE	205	203	405	200	1
LLDPE	835	1004	1198	238	45
HDPE	1825	1685	1657	241	225
PP	4140	3650	2993	193	848
PVC	1330	1275	2087	813	0

Source: CPMA website

The major manufacturers of HDPE are:

- IPCL
- GAIL
- Haldia Petrochemicals
- IOCL
- BPCL

The major manufacturers of LDPE are:

- IPCL owned by Reliance Industries Ltd.

The major manufacturers of PVC in India are:

- Reliance Industries
- Finolex Industries
- DCW

## 2. Technology

In addition to the conventional technologies, the manufacture of technical textiles requires specific unconventional spinning, weaving, knitting, braiding and nonwoven technologies. The details of these technologies have been summarised in the exhibit below.

Exhibit D-16: Key technologies used in Technical textile

Technology	Applications	Manufacturers
<b>Spinning Technologies</b>		
DREF Spinning	Hometech, Protech, Indutech, Meditech, Packtech, Mobiltech	Fehrer, Austria
Warp Spinning	Hometech, Clothtech, Mobiltech	Leesona, US Mackie, U.K. Suessen, U.K.
Technology	Applications	Manufacturers
<b>Weaving Technologies</b>		
Projectile Weaving	Agrotech, Geotech, Indutech, Buildtech	Juegens, Germany Sultex, Switzerland Texilmach, Russia
Rapier Weaving	Mobiltech, Protech, Sportech	Cobble Blackburn, UK CTMTC, China Dornier, Germany Giropan NV, Belgium Juegens, Germany Mackie, U.K. Metag, Italy Mullaer Frick, Switzerland Panter, Italy Picanol, Belgium Promatech, Italy Spa Textile, Spain Sultext, Switzerland Texo, Sweden Trinca, Italy
Air-Jet Weaving	Mobiltech, Sportech	CTMTC, China Dornier, Germany Investa International, Czech Republic Mullaer Frick, Switzerland Panter, Italy Picanol, Belgium Promatech, Italy

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Technology	Applications	Manufacturers
		Sulzer Tessile/Smit Textile, Italy Sultext, Switzerland
Water-Jet Weaving	Buildtech, Clothtech	CTMTC, China Nissan, Japan
Circular Weaving	Packtech, Meditech, Indutech	Frederick Enterprises Co. Ltd., Taiwan Karl Mayer, Germany Lohia, India Sima, Italy Starlinger, Austria
Three Dimensional (3D) Weaving	Buildtech, Mobiltech, Protech, Indutech, Meditech, Sportech	Multi-axial warp kit(MWK) by Liba ParaGlass structural core laminate by Parabeam
Multiphase Weaving	Geotech, Buildtech	Sultext, Switzerland Techmaslexport, Russia
Knitting Technologies		
Technology	Applications	Manufacturers
Circular Knitting	Homotech, Indutech, Protech, Meditech, Agrotech, Packtech, Sportech	Artex Group, USA Berney Knitting Machinery Co. Inc., USA ITM Ltd. South, USA Monarch Knitting Machinery Corp., USA Textram Inc., USA Pai Lung Machinery Mills Co. Ltd., Taiwan Keum Young Machinery Mill Co. Ltd., Korea Texmac Inc, USA Karl Mayer, Germany
Flat Knitting	Meditech, Protech, Buildtech, Mobiltech	Shima Seiki, Japan Stiger, Germany Kauo Heng, Taiwan Elex International, India SuoHwan Machinery Co., Taiwan Brother Industries Ltd., Japan Keum Young Machinery Mill Co. Ltd., Korea

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Technology	Applications	Manufacturers
		Stoll H GmbH & Co., Germany Protti SpA, Italy Universal Maschinenfabrik, Germany
<b>Warp Knitting</b>		
a) Tricot Machines	Agrotech, Homotech, Indutech, Packtech, Sportech, Geotech, Mobiltech, Buildtech	LIBA, Germany Cummins Machinery Corporation, USA ITM Ltd. South, USA Karl Mayer, Germany Jakob Muller AG Frick, USA
b) Raschel Machines	Packtech, Indutech, Agrotech, Clothtech, Sportech, Geotech, Meditech, Homotech, Buildtech	Cummins Machinery Corporation, USA ITM Ltd. South, USA Karl Mayer, Germany Cornez SpA, Italy Jakob Muller AG, USA Arlin Industries, USA LIBA, Germany
c) Stitch-bonding	Homotech, Indutech, Mobiltech, Packtech, Clothtech, Protech	Chima Inc, USA Karl Mayer, Germany Textima Import Export, USA Southern Mill Supply Corp., USA Jakob Muller AG, USA
d) Multiaxial Knitting	Mobiltech, Geotech, Protech, Indutech, Meditech, Sportech, Buildtech	American LIBA Inc., USA Cummins Machinery Corporation, USA Fillattice SpA, Italy Fletcher International Inc., UK Jakob Muller AG, USA Mayer Textile Corp., USA
e) Spacer Fabrics Knitting	Sportech, Mobiltech, Homotech, Meditech, Indutech	LIBA, Germany Cummins Machinery Corporation, USA Comez SpA, Italy Karl Mayer, Germany Jakob Muller AG, USA
<b>Braiding Technologies</b>		
Technology	Applications	Manufacturers

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Technology	Applications	Manufacturers
Braiding Machinery	Mobiltech, Sportech, Meditech, Indutech	Barney Knitting Machinery Co. Inc., USA Fletcher International Inc., Spain Lamb Knitting Machinery Corp., USA United Textile Machinery Corp., USA Karl Mayer, Germany

In addition to these, specific machines are required for production of non –woven fabrics. The details of these have been summarised as under:

Exhibit D-17: Machinery for non woven

S.No	Machines Suppliers	Process	Capacities	Applications
1	<b>Erko-Trutzschler GmbH, Germany</b>	Opening, blending & mixing machines, Air lay cards	25T/day	Wipes, Cotton pads, Surgical gowns, Drapes, Geotextiles, Automotive Textiles, Filter fabrics, Agrotextiles, Home furnishing,
		Opening, blending & mixing machines, Needling Technology	100-1200gsm, 6.5mts wide.	Geotextiles
		Opening, blending & mixing machines, Needling Technology	250 to 1500gsm, 3.0 mtr wide	Automotive Textiles,
		Opening, blending & mixing machines, Needling Technology	250 to 100gsm, 3.2mts.	Filter fabrics
2	<b>Fleissner GmbH, Germany</b>	Fibre production plants, Spunlace lines, Driers	25T/day	Wipes, Cotton pads, Surgical gowns, Drapes,
3	<b>Fong's, Hong</b>	Complete	25T/day	Cotton bleaching

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S.No	Machines Suppliers	Process	Capacities	Applications
	<b>Kong</b>	bleaching line		
4	<b>Gavazzi , Italy</b>	Cake opener to Bale press	25T/day	Fibers into Bales
5	<b>Fleissner Belt Ovens, Germany</b>	Thermobonding & Fusion lines, Hot ovens, Low speed winders	3mts wide	Nonwovens, Coating applications, Industrial wipes, Textiles Finishing, Rubberized coir.
6	<b>Falu, Switzerland</b>	Conversion machines		
		Cotton pads	240 cotton pads per min	De-makeup cotton pads
		Cotton Swabs	2700 cotton swabs	Cotton swabs
7	<b>Bouda, Austria</b>	Conversion machines		
		Zig-zag cotton		Medical purpose
		Cotton rolls		Medical purpose
		Cotton balls		Medical purpose.
8	<b>Andritz Kusters</b>	Laminating & finishing calendars rollers		Apparel, home textiles, sport textiles, technical textiles, nonwovens.
9	<b>Bastian, Germany</b>	High speed winders	3.2 Mtr	Nonwovens, Bopp films, etc.
		High strength PET fibres	300T/ annum	Bullet-proof vests, helmets, armours, anti-cut gloves, rope, marine use, cement reinforcing material
10	<b>Shaoyang Textile Machinery Co. Ltd., China</b>	Spun bond line,	3.2mts wide, 3.2 MS, 10-150gsm	Geotextiles, Medical textiles, Automotive, Hygiene, Packaging.
11	<b>Hanwei Machinery Manufacturing Co. Ltd., China</b>	Diapers, Adult diapers, Sanitary Napkins, Pull up diapers.		
		Diapers	400 pcs/min	Baby diapers, adult diapers
		Lady napkins	350 pcs/min	Sanitary napkins

\*Note: As meeting with machinery suppliers is still awaited the above list is only indicative and would change as per inputs from key suppliers

### **3. Policy framework**

#### **Technical textile policy of Central Government**

Indian government has been running schemes for promotion of investment into technical textile industry in India. These are:

##### **Technology Up-gradation Financial Support Scheme(TUFS)**

TUFS scheme was first introduced in 1999 to help industry players up-grade to newer advanced technology. It has been the fore front of technological up-gradation and development in India for the textile sector.

TUFS scheme aims at developing the technology levels of machinery and installation of Indian textile sector by providing financial benefits to the promoter of the industry which is going for a new advanced technology installation, capacity expansion or machinery up-gradation. The scheme aims to increase the production infrastructure to state of the art technology and therefore, it has set various threshold parameters, up-gradation below which would not qualify.

##### ***Eligibility***

Installation of the following machinery would make the investment eligible for TUFS scheme benefits:

- Cotton Ginning and Pressing
- Spinning/Silk Reeling & Twisting, Synthetic filament yarn Texturising, Crimping & Twisting machinery
- Manufacturing of viscose filament yarn and viscose staple fibre
- Weaving / Knitting
- Technical Textiles and non-woven machinery
- Garment / Made-up manufacturing
- Processing of fibre, Yarn, Fabrics, Garments and made-ups
- Jute industry machinery
- Energy saving & process control equipments for various sectors
- Machinery for CAD, CAM and design studio.

For being eligible under the scheme the size of investment must be above the minimum economic size and the technology being purchased should be higher than the benchmarked technology.

In addition to this, investment in machinery for development of common infrastructure, in house R&D, energy saving devices, etc would be eligible for up to 25% of the cost of machinery.

### ***Quantum of Benefit***

Under the scheme, an industry player going for new installation, expansion or modernisation of machinery can avail the following benefits:

- Re-imburement of up to 5% of the interest charged by financial institutions for a maximum of five years. The promoter must invest at least 20% of the cost of machinery.
- The Scheme provides 15% Margin Money subsidy for SSI textile and jute sector in lieu of 5% interest reimbursement on investment in TUF compatible specified machinery subject to a capital ceiling of Rs. 500 lakh and ceiling on subsidy Rs.45 lakh.
- The Scheme provides 5% interest reimbursement plus 10% capital subsidy for specified processing machinery excluding CETP, garmenting machinery and machinery required in manufacture of technical textiles.
- The Scheme provides 5% Interest subsidy or 25% capital subsidy on benchmarked machinery at par with handloom sector.

### **Technology Mission on Technical textiles**

The TMTT scheme is aimed at improvement of basic infrastructure in terms of testing facilities, lack of market development support, skilled manpower, R&D, improved regulatory measures, preparation of specifications and standards for technical textiles, etc. The scheme is being implemented in two phases, the details of which are as follows:

#### ***Mini Mission 1:***

Under Mini mission 1, four COEs were upgraded to a state of the art technology level and four new COEs were created between 2011 and 2013. This aimed at developing testing and R &D facility for technical textiles within India.

#### ***Mini Mission 2:***

Under Mini mission 2, support would be provided for:

- Development of business start –ups
- Conduction of seminars and workshops on technical textiles
- Support for contract research
- Support for development of market for sale to institutional players

- Support of domestic and export market development of technical textiles
- Identification of regulations and standards for technical textiles

#### **Focus Product Scheme (FPS) for technical textiles**

The objective of this scheme is to incentivize export of products that have high export intensity or employment potential in order to offset infrastructure inefficiencies and other associated costs involved in marketing these products. Exports of notified products to all countries (including SEZ units) shall be entitled for Duty Credit scrip equivalent to 2 % of FOB value of exports (in free foreign exchange). There are 33 Technical textile products that are allowed for FPS benefits under this scheme.

#### **Promotion of agro-textiles in north eastern states**

The aim is to utilize Agro-textiles in improving the horticulture and floricultural produce of the NE states. With increasing acceptability of Agro-textiles, entrepreneurship in the area of agro-textiles production in the country will get an impetus. The growth of usage of Agro-textile products in the country will thus benefit both agriculturists as well as textile entrepreneurs in the country.

It is proposed that in the project period (5 years), Agro-textiles will be utilized to improve the horticulture and floricultural produce of the Northeast states by providing technological and financial support for establishing the demonstration centres and disburse Agro-textile-Kit with overall fund outlay of US\$ 10 million. It would aim at creating awareness and dispersal of agro-textile kits.

## State-wise Technical Textile policy

Textile industry is wide spread sector of the Indian economy having a major role to play in the economy and employment generation for many states. The key states where textiles and related activities play a significant role in the economy are Gujarat, Maharashtra, Rajasthan, Tamil Nadu, Karnataka, Andhra Pradesh and the North Eastern States in particular Assam. State specific textile policies for the key states with emphasis on the technical textiles have been discussed in the subsequent sections.

### Gujarat

Textiles play a crucial role in the economy of Gujarat, with organisations involved in activities across the textile value chain. Gujarat also has a major chunk of Indian technical textile industry.

#### Textile policy

Key highlights of the textile policy of Gujarat published in 2012 and valid till 2017 are:

#### ***Scheme1: Financial Assistance via credit linked subsidy***

- Scheme for Financial Assistance by way of credit linked interest subsidy in Ginning & Pressing, Cotton Spinning, Weaving, Dyeing & Processing, Knitting, Garment/Made-ups, Machine Carpeting, Machine Embroidery and any other activities/ process like crimping, texturising, twisting, winding, sizing etc. within the Textile value chain. The maximum interest subsidy would be limited to 5% with an exception of up to 7% for Spinning and made-up garmenting unit. This scheme would be in addition to any other scheme as per Government of India
- A Special power tariff concession of one rupee per unit would be provided in the overall power bill for a period of five years to the spinning units as a promotional incentive for starting a cotton spinning unit.
- Units setting up a captive power plant would be given assured supply of lignite for a period of five years via an agreement with GMDC.
- Refund of VAT up to 100% is refundable for products within value chain of cotton to garments and made ups. The scheme is applicable on purchase of Raw material as well as on purchase for fixed assets in a year. The scheme is applicable for a period of 8 years.

***Scheme2: Assistance in technical textiles***

- Maximum interest subsidy of up to 6% will be available for establishment of new enterprise, expansion and modernisation of a technical textile unit. The subsidy would be applicable only on new and modern plant and machinery purchase and for a maximum period of five years.
- Second Machinery having a residual life of minimum 10 years and cost of less than 50% of new machinery would be considered for interest subsidy to a maximum extent of 60% of the cost of the plant and machinery.

***Scheme3: Assistance for Energy Conservation, Water Conservation and Environmental Compliance to existing units***

- Assistance to a maximum of Rs. 50,000/- or 50% of the cost would be given to firms having an existence for more than three years for conducting water audit, energy audit and environmental compliances.

***Scheme 4: Assistance for Technology acquisition and up-gradation***

- Assistance to an extent of 50% of the cost or Rs. 25 lakh would be provided to enterprises acquiring a new technology for specialised application. The beneficiary can avail the scheme only once and it would be applicable only for acquiring the technology for the first time in India.

***Scheme5: Assistance for Apparel training Institutes***

- Autonomous institutes having a background of textile or apparel industry or skill development would be provided a one-time assistance of up to 85% of the cost to a maximum extent of Rs. 3 crore including a maximum of 25% for machinery and equipment, for setting up new training institutes. The cost of land and recurring expense would be borne by the promoter.
- Assistance to a maximum of Rs. 20 lakh and up to 50% of the up-gradation cost would be provided to different ITIs and training centres who would come up for up-gradation of training centre to make them viable apparel training centres.
- Assistance to training institutes up to Rs. 7000/ - per trainer for training of trainers would be provided up to a maximum of 100% if the trainer is attending a GoI or a PSU promoted institute and 50% if the trainer is attending a Private sector promoted institute.
- Assistance to trainees in form of re-imbursement of tuition fees up to Rs. 7,000/- or 50% of the fees would be provided for attending trainings of at-least 120 hour course.

***Scheme 6: Training support for power-loom sector***

- Stipend up to Rs. 2500/- per trainee per trainee for a period of maximum three months, would be given to the trainee under-taking power loom weaving training under ATIRA, MANTRA or at Skill Development Centres promoted by State or Central government.
- Allowances at Rs. 200 per day for a maximum of two days would be provided to weavers to help him upgrade skills for working on auto loom, high speed and shuttle less looms, where in the weaver would not be charged any fees for the same by institutions.
- Allowances at Rs. 300 per day for a maximum of six days would be provided to jobbers to help him upgrade skills for working on auto loom, high speed and shuttle less looms, where in the weaver would not be charged any fees for the same by institutions.

***Scheme 7: Support for establishing textile and Apparel Park***

- State government would provide assistance to a maximum of Rs. 10 crore or 50% of the cost for setting up common infrastructure of a textile park. The financial assistance can go up to Rs.30 crore for setting up a spinning park. The park must have provision for at least 20 manufacturing units or in case of spinning park area of a minimum 150 acres with space for setting 10 spinning units.

**State textile policy Highlights for technical textile**

Gujarat State government has a specific financial assistance scheme for promotion of technical textile industry in Gujarat. The scheme provides credit linked interest subsidy at 6% over and above any incentive available from Government of India. The eligibility and assistance criteria for the scheme are discussed as under:

***Eligibility***

All industries of technical textiles spread across the 12 segments are eligible for the scheme. Both new and existing enterprises can avail this scheme for expansion and up-gradation in the technical textile sector. The scheme is also be valid for purchase of machinery specified under the TUF scheme. However, the beneficiary cannot avail benefit from any other State sponsored schemes for the same purpose while availing this scheme.

***Quantum of assistance***

A Maximum interest subsidy of 6% would be provided by Govt. of Gujarat in addition to any other incentive by Central government. The subsidy would be provided for a maximum of five years and would

be applicable only on the interest levied by financial institutions to those organisations which pays regular instalment. Defaulters would not be provided the subsidy during the default period.

The assistance would be provided only for investment in new and modern plant machinery as specified under TUF scheme of GoI, while establishing new enterprise or modernisation, expansion and diversification of existing enterprises.

The benefit can also be availed while acquiring second hand machinery on up to 60% of the purchase value of the second hand machinery. However, the second hand machinery must have a 10 years vintage and 10 years of residual life at time of acquisition with the total cost of acquisition less than 50% of the cost of new machinery.

## **Maharashtra**

While Maharashtra has many large textile units and allied industries, the textile policy of Maharashtra is specifically aimed at development of certain under developed areas of Maharashtra.

### **Textile policy**

The salient aspects of the new textile policy of Maharashtra State for 2011-17 have been enumerated as under:

- New co-operative spinning mills in Vidharba, Matharwada and North Maharashtra region would be given equity support up to 5% as per the existing financial pattern of 5:45:50.
- Subsidy of up to 10% of the total cost of project for shuttle-less power-looms, warping, sizing, Yarn dyeing, dyeing , processing and garmenting unit would be provided to co-operative societies undertaking the project in order of the merit of the project and according to the availability of funds.
- Subsidy of up to 5% of the cost of project for setting up co-operative power loom units by ST/ SC and other minority communities would be provided by the government of Maharashtra.
- A 10% capital subsidy would be provided for modernisation of power loom units of SC/ ST and minority communities.
- A 10% capital subsidy would e provided to enterprises starting new textile projects in Vidharba, Matharwada and North Maharashtra regions.

- Interest subsidy on long term loans linked with TUF scheme of GoI would be provided for starting a new textile project or modernisation, expansion and rehabilitation of an existing project.

### State textile policy Highlights for technical textile

Maharashtra State does not have any specific policy for technical textiles industry.

## **Karnataka**

Karnataka has come up with an encouraging textile policy for the year 2013-18 with an aim to increase investments in textile sector. The state aims to invest a total of Rs. 10,000 crore with focus on all segments of the textile industry in the coming five years.

### Textile policy

New textile policy for Karnataka released in 2013 and valid till 2018 focuses on the following areas:

- Strengthening of textile value chain
- Technical Textiles
- Geographical dispersion of textile and garmenting units
- Human resource development
- Infrastructure development
- Technology up-gradation of entire value chain
- Capacity building
- Institutional development
- Standards and compliances

Interventions in the above mentioned areas would be provided through the following measures:

### ***Credit linked Capital subsidy***

Credit linked capital subsidy would be provided to incentivise entrepreneurs and existing business men to go for capacity addition and new projects in different districts of Karnataka. Half of the share of this subsidy would be provided as subsidy once the developmental milestone is reached and the other half would be provided as interest subsidy for a period of five years. The different schemes under capital subsidy are:

- **Credit linked capital subsidy:** A capital subsidy of up to 20% of the cost of new plant and machinery would be provided to the enterprises starting a new project or modernising or

expanding an existing project. While 20% subsidy is being offered for projects coming up in areas having little development, 15% is being offered in districts having a sustainable development but a small textile industry. The upper cap for the subsidy is based on the value of total investment of the project and has been mentioned as under:

Exhibit D-18: Subsidy details

Project investment	Maximum value of subsidy
Up to Rs. 10 Crore	20% of new fixed assets
Rs. 10 Crore to Rs. 25 Crore	20% of new fixed asset or Rs. 3 Crore
Rs. 26 Crore to Rs. 50 Crore	20% of new fixed asset or Rs. 4 Crore
Rs. 50 Crore to Rs. 99 Crore	20% of new fixed asset or Rs. 6 Crore

- **Special capital subsidy for technical textiles and integrated units:** In addition to the capital subsidy, technical textile projects are eligible for an additional 10% subsidy on value of plant and machinery to a maximum of Rs. 25 lakh. Integrated units are also eligible to an additional subsidy of 20% of Rs. 30 lakh if they are being developed in remote under-developed districts and a subsidy of 10% or Rs. 25 lakh if they are coming up in a developed district.
- **Capital subsidy for locating in designated textile park:** A capital subsidy of 5% or Rs. 10 lakh would be provided to units which are locating in the designated State government or Central government textile parks.
- **Capital subsidy for Eco friendly units:** Textile units would be given a 20% capital subsidy in plant and machinery for purchase of cleaner and environmental friendly technologies. The subsidy would be limited to a maximum of Rs. 20 lakh

#### *Credit linked interest subsidy*

- Half of the amount of capital subsidy to be given as per the previous section, would be distributed as interest subsidy to the entrepreneur or businessman over a period of five years. This would be from the capital subsidy planned and not exclusive to it.

#### *Entry Tax and Stamp Duty re-imburement*

- Full re-imburement would be provided on the entry tax paid for plant and machinery and capital goods inclusive of the ones used for captive power generation, common effluent treatment and waste disposal units. Stamp duty re-imburement up to 50% for developed

districts and full re-imbursement for remote under-developed districts would be provided for land either allotted or purchased or leased.

### ***Common Infrastructure for textile parks***

- Common infrastructure such as CETP, STP, Waste disposal facility, Power supply infrastructure, Drainage system, captive power plant, telecommunication system, testing laboratory, design centre, factory building, roads or any basic infrastructure being set –up at a green field textile park would be eligible for a subsidy of up to 40% of the cost of project up to a maximum of Rs. 20 crore.
- New common Infrastructure buildings coming up in brown field projects would be eligible for a 40% subsidy with a maximum cap of Rs. 12 crore.
- If a new Greenfield project is coming up in a backward area and occupies at-least 51 acre of land, a subsidy of 40% or Rs. 25 crore would be provided for common infrastructure development.
- Capital subsidy of up to 50% of project cost with a maximum limit of Rs. 5 crore would be provided for starting a Central Common Effluent treatment Plant (CETP) or hazardous waste disposal unit in the state.
- Power subsidy of up to Re. 1 per unit would be provided for all value chain activities of textile value chain as well as units of technical textile and new Greenfield projects.

### ***Subsidy for Mega Projects***

- In case of mega projects of more than Rs. 100 crore which provide direct employment to at least 150 employees, a capital subsidy of 10% of the fixed assets with a maximum limit of Rs. 10 crore would be given to the promoter. The project would also be eligible for tax benefits of up to 10% on state taxes, 100% re-imbursement of Stamp duty and entry tax and up to 50% re-imbursement for expenses incurred towards employee ESI and EPF. The above mentioned power subsidy of Re.1 per unit would also be valid for mega projects.

### ***Capacity Building***

- Capital subsidy for development of market development and branding centre up to 50% or Rs. 50 lakh would be provided
- Capital subsidy for design development centre up to 50% or Rs. 25 lakh would be given

- Capital subsidy in form of re-imbusement of 50% of project cost or Rs. 5 lakh would be given for projects for developing of standards and compliances.

### **State textile policy Highlights for technical textile**

Karnataka's textile policy puts a special thrust towards growth of technical textile industry in Karnataka. Technical textile units are eligible for an additional 10% capital subsidy over and above the general capital subsidy for a textile unit. This takes the maximum capital subsidy for a technical textile unit to up to 30% of the project cost. While the general 20% subsidy is applicable on investment in new fixed assets, the subsidy for technical textiles is applicable only on new plant and machinery for technical textiles.

In addition to this, the State plans to start a Centre of Excellence (COE) with Government of Karnataka as lead partner and with due support from existing COEs. The COE would be funded by State government and would undertake activities like R&D, HRD, Testing and evaluation, Incubation centre, etc.

The State plan for investment into technical textiles in the coming five years has been shown as under:

Exhibit D-19: Investment plan of Karnataka Govt. for textiles

Sector	Investment planned (in Rs. Crore)					
	2013-14	2014-15	2015-16	2016-17	2017-18	Total for 5 yrs
All textiles	1,002	1,552	2,462	2,497	2,487	10,000
Technical textiles	200	250	400	425	425	1,700
Share of technical textile	20%	16%	16%	17%	17%	17%

## **Rajasthan**

Rajasthan launched a special customised package for development of textile sector in the state in 2013, which would remain in effect till 2020.

### **Special Customised package for textile sector**

The salient aspects of the customised package for textile sector have been enumerated as under:

#### ***Eligibility***

The package would be applicable for the following industries:

- Any new textile or technical textile enterprise where the promoter is making a minimum investment of Rs. 25 lakh and providing employment to at least ten workers.

- Any existing textile enterprise including technical textiles unit going for Up-gradation, modernisation, expansion or diversification where in it would be investing at least Rs. 25 lakh with a minimum employment generation for 10 workers.
- Revival of a sick textile or technical textile unit through a minimum investment of Rs. 25 lakh and employment generation for 10 workers

### ***Quantum of Benefits***

The key benefits and schemes under the package are:

#### **Interest Subsidy:**

- Interest subsidy of 5% per annum for would be provided to textile units going for investment of up to Rs. 25 crore. An additional subsidy of 1% would be given to enterprises going for a fixed capital investment of more than Rs. 25 crore.
- Interest subsidy for a technical textile unit would be higher at 7% per annum.
- Interest subsidy would be given for a period of maximum five years, only for the loan taken from an institution recognised by RBI.

#### **Re-imburement for VAT**

- Incentive in form of re-imburement of up to 60% of VAT would be given on purchase of yarn by the textile or technical textile unit for a period of maximum five years.

### **State textile policy Highlights for technical textile**

Rajasthan government is providing an addition 2% interest subsidy for technical textile units when compared to a textile unit, taking the total subsidy for technical textile unit to 7% per annum.

## **Andhra Pradesh**

Andhra Pradesh launched a special textile and apparel promotion policy in 2005 applicable for a period of five years till 2010. In 2010, the government in its Industrial and investment policy announced the extension of the textile policy for a period of another five years till 2015.

### **Textile and Apparel promotion policy**

The textile and apparel promotion policy focuses on development of three crucial sectors in Andhra Pradesh through a cluster approach. These are the Handloom sector, the power loom sector and textile

and apparel sector. The salient aspects of the policy for textile and apparel sector have been enumerated as under:

#### ***Infrastructure development***

- The state government would create export and apparel parks using cluster approach to promote textile and apparel industry in the State.
- It would develop Integrated Textile Parks under SITP scheme of Central government through SPVs, land for which would be provided by the State government to the SPV.
- State government would provide a special incentive for mega textile projects requiring investment of more than Rs. 100 crore and providing employment to more than 2,500 workers.

#### ***Promotion of spinning industry***

- Encouragement would be given to new spinning units of more than 12,000 spindles for promotion of spinning units in the state.
- A grant of up to Rs. 1000 per worker would be given by the State government to the Spinning unit for geographical diversification and starting of new spinning ventures across the state.

#### ***Promotion of garmenting industry***

- Garmenting units would be given an incentive of up to Rs. 5000 per worker employed for meeting requirements of training of employee.
- Garmenting units would be given an additional power tariff concession of Rs.0.25 per unit, in addition to the existing concession of Rs. 0.75 per unit being given under Industrial policy of the State.
- Garmenting and export units would be provided 100% re-imbusement of stamp duty as well as exemption from zoning regulations and urban land ceiling exemption.

#### **State textile policy Highlights for technical textile**

The State does not have any specific policy for the technical textile sector.

## 4. Testing facilities and R &D infrastructure

Technical textiles manufacturing calls for conformance to standards (both international and national) based on the type of product and the nature of application. In India, the testing facilities for technical textiles are predominantly set up by the Textile Research Associations (TRAs). These facilities ensure that the necessary tests required ensuring that the products being manufactured meet the requirements of the prescribed standards are carried out at a nominal cost. In addition to these facilities, some of the major manufacturers also have their own in-house testing facilities required to monitor key production parameters.

Till date a total of eight centre of excellence (COEs) to help develop the technical textile industry by providing required support for new product development and adequate testing facilities. The details of these eight COEs are:

Exhibit D-20: COEs present in India

SI No.	Centre of excellences	District	Specialisation
1	The Synthetic and Art Silk Mills' Research Association (SASMIRA),	Mumbai	Agrotech
2	Bombay Textile Research Association (BTRA)	Mumbai	Geotech
3	Northern India Textile Research Association (NITRA)	Gaziabad	Protech
4	South India Textile Research Association (SITRA)	Coimbatore	Meditech
5	PSG College of Technology, Coimbatore	Coimbatore	Indutech
6	DKTE Society's Textile & Engineering Institute (DKTE)	Kolhapur	Non woven
7	Ahmedabad Textile Industry's Research Association (ATIRA)	Ahmedabad	Composites
8	Wool Research Association (WRA)	Thane	Sportech

Out of these, four are old COEs having an existence of over four years. These are SASMIRA, BTRA, NITRA and SITRA. These have well developed labs capable of providing all important testing facilities. They have also been actively involved in development of standards for different technical textile products. The details of these facilities are as discussed below:

### SASMIRA – COE for Agrotech

SASMIRA is engaged in multiple activities providing scientific and technical assistance to textile and allied industries. Some of the activities being carried out are:

- Development of technical textiles
- Product development

- Effluent treatment, water recycling and waste re utilization
- Development of energy conservative processes

### **Testing facility at SASMIRA**

For technical textiles, SASMIRA provides facilities for testing, evaluation and investigation of products such as polymer, fibre, yarn, garment and other textile related products. It specializes in testing of agrotech products. The facility was up-graded under the TMTT scheme of Government of India and has the following testing capabilities:

**Exhibit D-21: Testing facilities at SASMIRA**

SI No.	Product	Sub-product	Testing infrastructure
1	Fibre	Natural & Synthetic	Testing on mechanical, chemical and biological parameters along with few analytical parameters wherever applicable
2	Yarn		
3	Fabric	Apparel, garment and Technical textile	
4	Technical textile	Specialization - Agrotextile Others – Geotextile, Mobiltech, meditech, Sportech and Protech	
5	Dyes	All class	
6	Auxiliaries	Finishes and coatings	
7	Effluent	Dye house and water samples	
8	Miscellaneous	Polymer characterisation	

*IMaCS analysis*

The Agrotech COE testing facilities is equipped with standards of American Standard for Testing and Materials (ASTM), British Standards (BS), German Institute for Standardisation (DIN), International Organisation for Standardisation (ISO) and European Standards (EN) to cater to the industries needs for export orders.

The Agrotech COE laboratory is accredited with NABL in accordance with international testing standards ISO/IEC 17025- 2005 for physical and chemical evaluation of textiles. In addition, the laboratory is also accredited with American Association for Lab Accreditation (A2LA), USA for physical, chemical and microbiological testing of textiles and allied substrates. The American accreditation is able facilitate the industry players to export the Agrotech products to USA readily.

Further, to increase international exposure and acceptance of test results and for knowledge sharing, the COE has entered into foreign collaborations with American Association for Laboratory Accreditation(A2LA), USA for accredited testing services, Industrial Fabrics Association

International(IFAI), USA for marketing and entrepreneurship in technical textiles, International Jute Study Group(IJSG), for development of Agrotexile product from natural fibres and Colorado State University for research and development in Technical Textiles.

The COE is able to cater to the testing needs of most of the Agrotech players ranging from SMEs including Kusumgar, Polynova to large industry players like Garware and Tata Jhonson

### ***Research & Development (R&D) at SASMIRA***

COE for agrotech is also being used for development of new products and prototypes, providing innovation and R &D support to the industry. The key prototypes developed at SASMIRA are shown as under:

- Reflective ground covers
- Work wear for agro textiles
- Barrier packaging for agro-chemicals.

All these prototypes are currently under tests and trails to check fitness for commercial use.

## **MANTRA – COE for Agrotech & Coating and Lamination**

Manmade textile Research Association (MANTRA) is a pioneer institute in the filled of manmade textiles. The institute was set up in 1981 with an aim to develop to promote full fledged Research and development in the field of manmade textiles. Currently MANTRA is a support COE for Agrotech while it is in process of becoming a fully equipped COE for coated and laminated fabrics, the first of its kind in India.

### ***Testing facility at MANTRA***

The testing facilities available at MANTRA are:

Exhibit D-22: Testingfacility for agrotech

Sl No.	Test	Equipment
<b>Facilities at COE - Agrotech</b>		
1	Testing linear density of fibre	Vibrodyne
2	Permeability of textile	Permeability of geotextile is tested by passing different glass bead fractions through the textile using a hydrodynac sieve texster
3	Fabric thickness	The institute ha film thickness tester which can be used to test the fabric
4	Water permeability test	The COE is equipped to test horizontal water

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SI No.	Test	Equipment
		permeability for different textiles.
5	Water vapour permeability test	The MOCON based water vapour transmission tester available at the COE is capable of testing permeability through on woven and plastics.
6	Cold crack test	The COE has equipments to test the stability of the fabric at -40 degree Celsius
7	CBR puncture test	The Institute has equipment to test the puncture resistance of soil cover fabrics in accordance with DIN 54307
8	Tests for shade nets	The equipments available have capability of testing both the wind blocking and shading percentage of agro-textiles
9	Abrasion resistance test	TABER Dual head rotary resistance tester is capable of testing abrasion resistance even at 60 rpm speed.
10	Soil Cover porosity	The Institute has AOS tester which tests the porosity of the soil cover geo textile fabric
11	Weatherometer	The OUV test equipment measures the weathering resistance and life of the material by altering UV with moisture.
<b>Facilities at COE – Coating and laminating</b>		
1	Lenzing Water permeability test	The institute has LENZING water permeability tester used to test the permeability of non-wovens
2	Liquid strike through time test	The institute has equipment – “Lister” used to measure the strike through permeability for non-woven diapers.
3	Surface resistivity test	It can conduct test to measure electrical surface resistivity for fabric
4	Air Permeability test	The test instrument at MANTRA can be used to determine the air permeability of the fabric up to 200 pascal pressure
5	Flammability test	The institute does flammability tests for FR upholstery fabrics to measure the flammability of substrates.
6	WIRA spray testing	It is used to determine the resistance of fabric ,without water repellent coating ,to wetting
7	WIRA liquid absorbency time test	The COE has infrastructure to test the absorbing power of non wovens. It finds application in testing for surgical applications
8	WIRA liquid Absorption capacity test	The COE can test for liquid absorption capacity of a non woven fabric

\*Source: MANTRA website

## BTRA – COE for Geotech

BTRA is the COE for Geotech segment of technical textiles and is also one of the upgraded COEs. The testing facilities at BTRA are equipped to handle most of the testing requirements of the industry and are able to assist entrepreneurs to develop geo-synthetics products indigenously.

### *Testing facility at BTRA*

It is equipped for conducting all types of tests for geo-textiles. Details of the products that can be tested at BTRA are shown in the exhibit below:

**Exhibit D-23: Testing facilities at SASMIRA**

Sl No.	Product	Sub-product
1	Geo-textiles – woven & non-woven	Geo-textiles
2		Geo-grids
3		Geo-membranes
4		Geo-composites
5		Geo-synthetic clay liners
6		Geo-drain
7		Geo-cell
8		Geo-straps
9		PVD drains
10		Geo-nets
11		Turf reinforcement mats
12		Erosion control blankets
<b>Others</b>		
1	Glass composites	
2	Metal gabions	
3	Rope gabions	
4	Rubberised conveyors	Heavy duty conveyors
5	Foam	PU foam
6	Insulating pads	Non woven and rubberised
7	Non-woven	
8	Filters	Both woven & non woven
9	Waddings	Non woven
10	Reinforced belt for conveyor	Steel wire coated with PVC
11	Seat belt and its assembly	Car seat belts
12	Webbings	Nylon webbings

SI No.	Product	Sub-product
13	Coated fabrics	PVC and Teflon coated and foam laminated

*IMaCS analysis,*

Further, the Geotech COE testing facilities is equipped with standards of American Standard for Testing and Materials (ASTM), British Standards (BS), German Institute for Standardisation (DIN), International Organisation for Standardisation (ISO), INDA, EDANA and European Standards (EN) to cater to the industries needs for export orders.

The Geotech COE laboratory is accredited with GAI-LAP accreditation for geo-synthetics Institute, USA, which is one of the most reputed accreditation in the field of geo-synthetics. Further the lab is also accredited with NABL in accordance with international testing standards ISO/IEC 17025- 2005 for physical and chemical evaluation of textiles. The American accreditation is able facilitate the industry players to export the Geotech products to international markets.

Further, to increase international exposure and acceptance of test results and for knowledge sharing, the COE has entered into foreign collaborations with FITI (Testing Laboratory GRI, USA accredited), South Korea, and GRI (Geosynthetic Research Institute), USA. The COE is also the member of IGS (International Geosynthetic Society), USA; European Disposables and Nonwovens Industry Association (EDANA), Europe and Association of the Nonwoven fabrics industry (INDA), USA.

The COE is able to cater to the testing needs of most of the Geotech players ranging from SMEs including CTM technical textiles to leading players like TechFab and Strata.

### ***Research & Development (R&D) at BTRA***

The COE for Geotech also has also been at the forefront of developing new technologies by supporting technology's much needed prototype development. It has installed development facilities for Nonwoven products (geotextiles & others) by needle punching technology, Nonwoven products (geo-textiles & others) by Hydro entanglement technology and a development facility for woven geo-textile & other technical textiles. The major prototypes developed at BTRA are:

- Non-woven geo-textiles: This has been developed and tested in both laboratory environment and commercial environment. It has been commercialised and is actively being used by industry players to provide geo-textile solutions.
- Woven geo-textile: The woven geo-textile being developed by BTRA has been developed and tested. However, commercial production of the same

- Woven geo-textile: BTRA is also in process of developing a woven geo-textile which is currently under development.

## **SITRA – COE for Meditech**

SITRA is the COE for Meditech segment of technical textiles and is also one of the upgraded COEs. The testing facilities at SITRA are equipped to handle vast range of testing requirements of the industry and are able to assist entrepreneurs to develop wide range of products indigenously for import substitution.

### **Testing facility**

The Meditech COE testing facilities is equipped with standards of American Standard for Testing and Materials (ASTM), British Standards (BS), German Institute for Standardisation (DIN), International Organisation for Standardisation (ISO), Australian Standards and European Standards (EN) to cater to the industries needs for export orders.

The Meditech COE laboratory is accredited with NABL in accordance with international testing standards ISO/IEC 17025- 2005 for physical and chemical evaluation of textiles. Moreover, the COE has entered into collaboration with The University of Bolton, United Kingdom. This would also facilitate co-operation and exchange in research findings / research dissemination and staff deputation and training. Also, a MoU proposal with North Carolina State University, USA is under process. Once signed, this will open up possibilities for joint research programmes to be conducted in the field of Meditech

The COE is able to cater to the testing needs of most of the Meditech players ranging from SMEs including Nobel Hygiene, to leading players like KOB Medical Textiles and 3M.

### ***Research & Development (R&D) at SITRA***

The COE actively engages in furthering the cause of innovation both at technology and product level. In this respect, the COE with regards to developing innovative products and prototypes has exceeded its targets by developing nine prototypes up till now. It has been able to do so drawing on its own facilities set up for this purpose. The different prototypes being developed at SITRA are:

- Bifurcated Vascular Graft
- 3D Compression bandages for Lymphedema
- Spun-lace non-woven wound dressings for malodour wounds
- Breathable Surgical gowns treated with Nano Finishes
- Barbed - Bi-directional Surgical Sutures
- Development of 4-layered Face-Mask

- Development of Face Mask with Eye-Guard
- Development of Face Mask with Nylon 6-nanomembrane
- Development of 8-layered mopping pad

The COE is also running an incubation centre for the support of the emerging entrepreneurs. Till date COE has rolled out two products from its incubation centre – Ankle support and Gynae post Partum drape.

## **NITRA – COE for Protech**

NITRA is the COE for Protech segment of technical textiles and is also one of the upgraded COEs. The testing facilities at NITRA are equipped to handle most of the testing requirements of the industry and are able to assist entrepreneurs in testing and developing protective textiles indigenously.

### ***Testing facility at NITRA***

The COE is equipped to test the products including Protective Garments, Carpets, FR overall, Combat Uniforms, Upholstery.

Further, the Protech COE testing facilities is equipped with standards of American Standard for Testing and Materials (ASTM), British Standards (BS), German Institute for Standardisation (DIN), International Organisation for Standardisation (ISO), Australian Standards and European Standards (EN) to cater to the industries needs for export orders.

The testing laboratory is NABL accredited as per ISO/IEC 17025- 2005 standards and supports testing of various product groups spanning yarn, fibre, yarn and fabric. To keep pace with the world developments in technological advances in technical textiles the COE has fostered collaborations with Bolton University and Manchester Metropolitan University to enhance its acumen in Research and Development, Consultancy and training.

The COE is able to cater to the testing needs of most of the Protech players ranging from large industry players including Arvind Mills, Alok Industries, Ginni Filament to Defence organisations and SMEs including Dynamic industries, Superior Fabrics etc.

### ***Research & Development (R&D) at NITRA***

The COE actively engages in furthering the cause of innovation both at technology and product level. The COE has developed six prototypes up till now. These are:

- Fabric using High Modulus Polyethylene (HMPE) fibre

- Fabric using corn fibres
- Cut resistance gloves and apparels
- Protective clothing of anti-microbial fibres
- Technology for ultrasonic cleaning of garments
- Nylon Cotton Blended fabric (NYCO) for use by defence and para-military forces

In addition to these four new COEs were created in the span of last five years. The details of the same are:

### **ATIRA – COE for Composites**

ATIRA is the COE for Composite materials. It is a process focussed COE and is one of the newly formed COEs. The testing facility at ATIRA is under development with installation and commissioning of most of the equipment being completed

The COE is equipped to test product segments including CFRP/GRP/Thermoplastic composites/Plastics. Further, the Composite COE testing facilities is equipped with standards of American Standard for Testing and Materials (ASTM), and International Organisation for Standardisation (ISO), to cater to the industries needs.

The Composite COE laboratory is in the process of getting accreditation from NABL in accordance with international testing standards ISO/IEC 17025- 2005 and also from American Association for Lab Accreditation (A2LA). Moreover, the COE has entered into collaboration with North West Composites Centre, Manchester, U.K. for Testing, Accreditation, Affiliation & knowledge support in Composites Testing. Also, it is in talks with Fraunhofer Institute, ICT, Germany for collaboration in the areas of advancements with design, simulation analysis and prototyping of composites.

### **DKTE Society's textile and Engineering Institute – COE for Non woven**

DKTE is the COE for Non-woven; a process/ technology focussed COE and is one of the newly formed COEs. The testing facility at DKTE is under development and most of the testing equipment has been procured. However, the COE will be housed in a completely new building which is under development.

### ***Testing facility at DKTE***

The COE is equipped to test products including raw material (Fibre) and Nonwovens Fabrics. Further, the COE testing facilities is equipped with standards of American Standard for Testing and Materials (ASTM), European Standards (EN) and International Organisation for Standardisation (ISO), to cater to the industries needs. Further, the COE will procure the necessary testing standards on need base.

The non-woven COE laboratory is in the process of getting accreditation from NABL in accordance with international testing standards ISO/IEC 17025- 2005 and also from American Association for Lab Accreditation (A2LA). Moreover, the COE has entered into collaboration with Hochschule Niederrhein University, Germany for joint research in Nonwovens. Also, it is in talks with RWTH Aachen University, Germany for product development, standardisation in the area of Nonwovens

### ***Research & Development (R&D) at COE***

The COE is actively involved in innovation and research. It has developed a five prototypes till date. These are:

- Filter Fabric for recycling of Textile Effluent
- Herbal wound bandages
- Conductive textile Nonwovens as an Actuators
- Coir composite roofing panels
- PP homo-composite for crack resistant

All these products have already been tested.

## **PSG College of Engineering – COE for Indutech**

PSG is the COE for Indutech and is a more recently established COE. This being the case the testing facility is yet to acquire all its equipment after which the laboratory shall be duly accredited with suitable accreditations.

### ***Testing facility at COE***

The testing facility at the COE shall be providing testing services for normal and speciality fibres, natural and synthetic yarn, natural and synthetic fabrics, natural and synthetic Nonwovens, natural and synthetic ropes and cordages.

The COE is already in talks with universities such as Bolton Tech University, U.K., ITA, RWTH, Aachen University (Industrial Textiles and Composites), ITV, Denkendorf, Germany (Braiding), Hof, University

Germany (Automotive Textiles) and Carborundum Universal, India (Industrial Abrasives) for collaborations.

### ***Research & Development (R&D) at COE***

The COE is actively involved in research and development. It is in process of developing two prototypes for use in indutech. These are:

- Oil Absorption pads – Testing in progress
- Acoustics materials – Under development

## **Wool Research Association (WRA) – COE for Sportech**

WRA is engaged in industrial and fundamental research predominantly in the field of wool technology. The association renders its services to its members and non-members from textile industry, defence, customs, railways, state transports and other authorities in areas of product development, process development, testing and training.

Wool Research Association (WRA) has engaged itself in the development of technical textiles over the last two decades. It has foreseen the significance of this emerging technology. It had also undertaken a few sponsored projects relating to Sportech, Indutech, Mobiltech, etc. Of late Sportech products have assumed added significance for the following factors:

- Increased activities and participation in sports in the country.
- Availability of high performance fibres, new technologies of coatings and manufacturing.
- Higher level of sports standard and challenges within sporting nations.
- Newer sports requiring high dexterity, skill and sporting gears.
- New interest of the youth for outdoor activities and leisure.
- Growth of sports facility in the country.

### ***Testing facility at WRA***

The COE is in the process of procuring equipment for its testing and prototype facility. Further, the COE is also in the midst of procuring books and standards to enable information access to the industry stakeholders.

The COE is in the process of selection of leading international institutions regarding technical consultancy and collaboration. The institutions are:

- North Carolina State University
- RMIT University, Melbourne, Australia
- Trigon UK

### ***Research & Development (R&D) at WRA***

The COE is actively involved in research and development and has done 15 researches for the technical textile industry. The key R&D projects being done at the COE are:

- Non asbestos abrasive yarns for braids used as insulating material in lifting pumps
- 100% carbon woven fabrics for high heat resistance applications up to 1200' C
- Wool based flame retardant fabrics
- To develop a smart indigenous sleeping bag with heating property
- Design and development of high performance, Multifunctional, Protective Sportswear for various sports
- Development of water proof breathable sportswear with desired functional properties by eco-friendly water based coating techniques
- Development of thermal responsive high altitude multi layer protective clothing made principally of angora fibre.

## **Accreditation agencies**

It is necessary to obtain certain accreditations for the technical textile products manufactured in India to enable exports of the same to other countries as well as meet the necessary standards prescribed within India. The various accreditations and agencies are listed below:

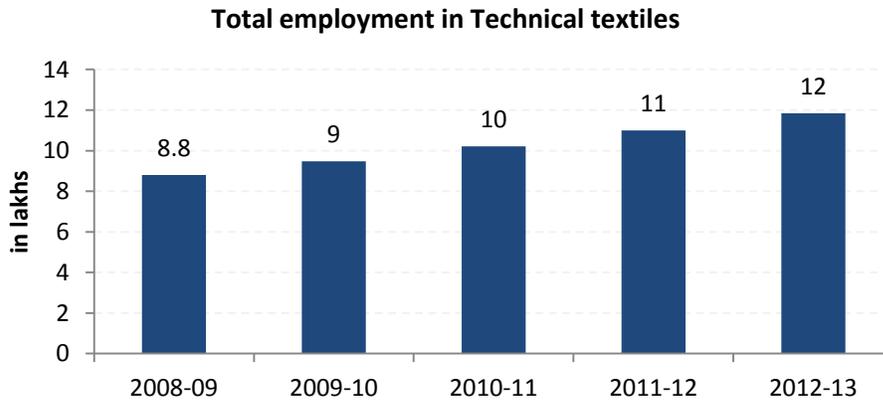
- ISO 17025 – National Accreditation Board for Laboratories,
- ISO 9000 – International Standards Organization,
- National Association of Testing Authorities(NATA), Australia,
- Standards Council of Canada,
- Japan accreditation board for conformity assessment,
- International Accreditation Japan,
- United Kingdom accreditation system,
- International accreditation service,
- American association of laboratories accreditation,

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- National voluntary laboratories accreditation program,
- German accreditation system for testing,
- Comite francais d' accreditation(COFRAC),
- Deutscher akkreditierungs rat(DAR),
- Raad Voor accreditatie(RVA)

## 5. Manpower Availability

The Indian technical textile industry employed 1.2 million<sup>13</sup> people in 2012-13. The employment in the industry has at the rate of 8% per annum during the last five years. The growth of man-power employed in technical textile sector can be seen as under:



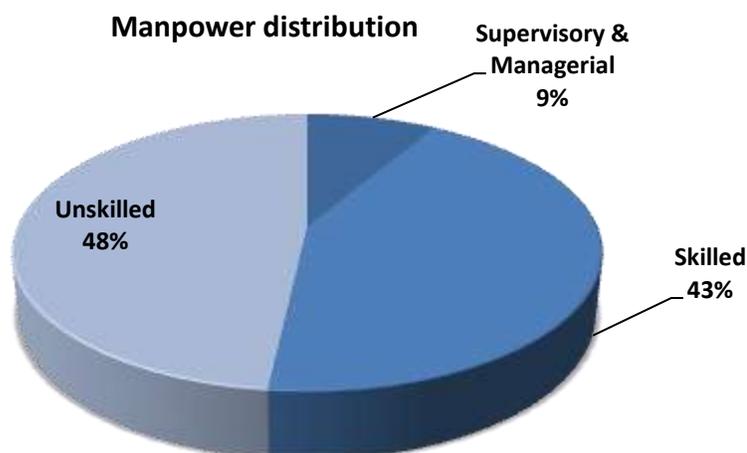
Source: [Technicaltextile.gov.in](http://Technicaltextile.gov.in), IMAcS analysis

Skilled manpower composes approximately 45% of the total manpower employed in technical textile industry. This is relatively higher when compared to the textile industry of India. However, the high skilled operations in non woven and technical textile manufacturing have been the driving force for employment of more and more skilled personnel. The distribution of supervisory, skilled and unskilled staff in the industry is as shown in the exhibit below.

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<sup>13</sup> Source: [www.Technicaltextile.gov.in](http://www.Technicaltextile.gov.in)

Exhibit D-24: Distribution of man-power across industry



Source: IMaCS analysis, Primary survey

Although the man-power in the technical textile industry has been growing at 8% per annum for the last four years, the industry faces shortage of skilled man-power. The key issues faced with respect to manpower by the industry are:

- **Lack of adequate ITIs and Polytechnics in the field of textile particularly for technical textile:** Technical textile industry requires skilled workmen for many operations like for coating of fabrics, production of non woven, and operation of advanced machinery required for technical textiles. As most of the segment of technical textile is relatively small, the institutes offering courses in the textile stream do not provide specific training and education which are required for technical textile industry. In absence of any technical institute churning out skilled labourers, most of the industry players have to provide on job training or develop training courses so as to train the employees to a threshold skill-set of operation in technical textiles.
- **High employee turn-over in the skilled category:** Industry faces lack of skilled labourers particularly in the segment of coated fabrics and advanced technologies. As the demand for skilled employees is very high, many workers after attaining a set skill set through training prefer to switch organisation in pursue of higher pay grades. As a result, the organisation often finds it difficult to get the appropriate replacement in due time, often leading to loss of production or forcing the initial employer to provide a salary hike to the worker, leading to increase in cost of production.

## Skill training

India has a total of twelve institutions that specialise in educating students on textile and technical textiles. These institutions offer under-graduate, post-graduate and also doctoral courses in textile sector. Most of these institutions are located in Maharashtra with a total presence in seven states. The details of these institutions are:

Exhibit D-25: Institutions specialising in textile education and research

Sl. No.	Name of Institution	District	State	Course Offered	Specialisation
<b>Colleges specifically for textile related courses</b>					
1	Dept. Of Textile Engineering - IIT Delhi	Delhi	Delhi/ NCR	B.Tech - Textile Engineering M.Tech - Textile Engineering and Fibre Science Technology PH.D	
2	UP Textile Technology Institute (UPTTI)	Kanpur	Uttar Pradesh	B.Tech - Textile Chemistry B.Tech - Textile Engineering B.Tech - Manmade Fibre Technology B.Tech - Textile Technology M.Tech - Textile Engineering M.Tech - Textile Chemistry	
3	The Synthetic and Art Silk Mills' Research Association (SASMIRA),	Mumbai	Maharashtra		Agrotech
4	Bombay Textile Research Association (BTRA)	Mumbai	Maharashtra		Geotech
5	Northern India Textile Research Association (NITRA)	Ghaziabad	Uttar Pradesh		Protech
6	South India Textile Research Association (SITRA)	Coimbatore	Tamil Nadu		Meditech
7	Manmade Textile Research Association (MANTRA)	Surat	Gujarat		Agrotech
8	PSG College of Technology	Coimbatore	Tamil Nadu	B.E - Textile Technology	Indutech

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Sl. No.	Name of Institution	District	State	Course Offered	Specialisation
<b>Colleges specifically for textile related courses</b>					
8	DKTE Society's Textile & Engineering Institute (DKTE)	Kolhapur	Maharashtra	B.Tech - Textile Technology B.Tech - Textile Chemistry B.Tech - Fashion Technology M.Tech - Textile Technology M.Tech - Textile Chemistry  Diploma - Textile Manufacturing Technology Diploma - Textile Technology	Non woven
9	Ahmedabad Textile Industry's Research Association (ATIRA)	Ahmedabad	Gujarat		Composites
10	Wool Research Association (WRA)	Thane	Maharashtra		Sportech
11	MANTRA				
12	Institute of Jute Technology	Kolkata	West Bengal	B.Tech - Jute & Fibre Technology B.Tech - Jute Technology M.Tech -Textile Technology	Jute Based Textiles

Source: Secondary sources

In addition to these institutions, there are another 26 colleges providing courses for engineering in textiles at the under-graduate level. The list of these institutions and colleges has been listed in the exhibit below:

**Exhibit D-26: Institutions offering courses in textile engineering**

Sl. No.	Name of Institution	District	State	Course Offered
<b>Textile courses offered at other colleges – Under Graduate Courses</b>				
1	University College of Technology	Hyderabad	Andhra Pradesh	BE - Textile Technology
2	Maharaja Sayaji Roa University of Baroda	Baroda	Gujarat	B. Tech - Textile Engineering M.E - Textile Engineering
3	L D College of Engineering	Ahmedabad	Gujarat	B.E - Textile Technology
4	Gujarat Technological Institute	Ahmedabad	Gujarat	B.E - Textile Technology
5	NGF College of Engineering Technology	Faridabad	Haryana	Fashion Technology & Apparels Engineering
6	Panipat Institute of Engineering and Technology	Panipat	Haryana	B.Tech - Textile Engineering
7	Visvesvaraya Institute of Technology	Belgaum	Karnataka	B.E - Silk Technology
8	Bapuji Institute of Engineering and Technology	Davangere	Karnataka	B.E - Textile Technology

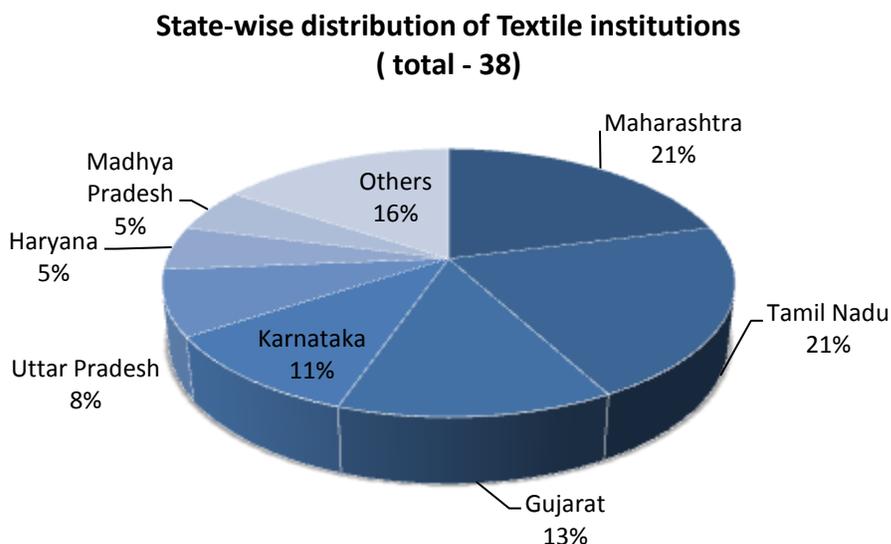
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Sl. No.	Name of Institution	District	State	Course Offered
<b>Textile courses offered at other colleges – Under Graduate Courses</b>				
9	Shri Jayachamarajendra College of Engineering	Mysore	Karnataka	B.E - Polymer Science & Technology
10	Government SKSJ Technology Institute	Bangalore	Karnataka	B.Tech - Textile Technology
11	Shri Viashnav Institute of Technology & Science	Indore	Madhya Pradesh	B.E - Textile Technology
12	Jawaralal Institute of Engineering and Technology	Yavatmal	Madhya Pradesh	B.E- Textile and Information Technology
13	Veer mata Jijabai Technological Institute	Mumbai	Maharashtra	B.Tech - Textile Engineering
14	Institute of Chemical Technology	Mumbai	Maharashtra	B.Tech - Fibres and Textile Processing Technology
15	ORISSA Institute of Textile Technology	Mumbai	Maharashtra	B.Tech - Textile Technology
16	Shri Guru Gobind Singh College of Engineering & Technology	Nanded	Maharashtra	B.Tech - Textile Technology
17	College of Engineering and Technology	Bhubaneswar	Orissa	B.Tech - Textile Engineering
18	Dr. B R Ambedkar National Institute of Technology	Jalandhar	Punjab	B.Tech - Textile Technology
19	Sangam University	Bhilwara	Rajasthan	B.Tech - Textile Technology
20	Karpagam University	Coimbatore	Tamil Nadu	B.Tech - Textile Technology
21	Sona College of Technology	Salem	Tamil Nadu	B.Tech - Textile Technology
22	Park College of Engineering & Technology	Coimbatore	Tamil Nadu	B. Tech - Textile Technology
23	K S Rangasamy College Of technology		Tamil Nadu	B. Tech - Textile Technology
24	Jaya Engineering College	Chennai	Tamil Nadu	B. Tech - Textile Technology
25	Bannari Aman Institute of Technology	Erode	Tamil Nadu	B.Tech - Textile Engineering
26	Harcourt Butler Technological Institute	Kanpur	Uttar Pradesh	B.Tech - Leather Technology

Source: Secondary sources

These colleges are spread across India with clusters in Gujarat, Maharashtra and Tamil Nadu.

Exhibit D-27: State wise distribution of textile institution



Source: IMAcS analysis

In addition to the above covered institutions offering textile courses, there are a total of 53 polytechnic and ITIs that offer specific diploma courses in textile sector. These have been listed as under:

Exhibit D-28: Institutions offering diploma courses in textiles

Sl. No.	Name of Institution	District	State	Course Offered
<b>Institutions, Polytechnic, ITIs offering diploma in textile field</b>				
1	Government Polytechnic	Chittoor	Andhra Pradesh	Diploma in Textile Technology
2	Government Polytechnic, Obulavariapalli	Kadaba	Andhra Pradesh	Diploma in Textile Technology
3	S.R.R.S Government Polytechnic	Karimnagar	Andhra Pradesh	Diploma in Textile Technology
4	Shri Ram Institute of Management Technology	Delhi	Delhi	Diploma in Textile Technology
5	Aryabhata Polytechnic	Delhi	Delhi	Diploma in Garment Engineering
6	Government Polytechnic - Altinho	Panaji	Goa	Diploma in Garment Engineering
7	Government Polytechnic for Girls	Surat	Gujarat	Diploma in Textile Technology
8	Gujarat Technological Institute	Ahmedabad	Gujarat	Diploma in Textile Technology
9	Maharaja Sayaji Roa University of Baroda	Baroda	Gujarat	Diploma in Textile Technology
10	Sir. Bhavsinhji Polytechnic Institute, Vidhyanagar	Bhavnagar	Gujarat	Diploma in Textile Technology

*Interim report on Baseline Survey of Technical Textiles in India 2013*

Sl. No.	Name of Institution	District	State	Course Offered
<b>Institutions, Polytechnic, ITIs offering diploma in textile field</b>				
11	Dr. S and S.S Gandhi College of Engineering Technology	Surat	Gujarat	Diploma in Textile Processing Technology Diploma in Textile Manufacturing Technology
12	Ganpat University	Mehsana	Gujarat	Diploma in Garment Engineering
13	Government Polytechnic	Hisar	Haryana	Diploma in Textile Technology
14	Central Polytechnic	Trivandrum	Kerala	Diploma in Textile Technology
15	Dr. B R Ambedkar Polytechnic College	Gwalior	Madhya Pradesh	Diploma in Textile Technology
16	Government Polytechnic	Mau	Madhya Pradesh	Diploma in Textile Technology
17	Shri Vaishnav Polytechnic College	Indore	Madhya Pradesh	Diploma in Textile Technology Diploma in Garment Engineering
18	NMIMS University	Mumbai	Maharashtra	Diploma in Textile Technology
19	University of Mumbai	Mumbai	Maharashtra	Diploma in Textile Technology
20	Tilak Maharashtra Vidyapeeth	Pune	Maharashtra	Diploma in Garment Engineering
21	Institute of Textile Technology, Choudwar	Cuttack	Orissa	Diploma in Textile Technology
22	Punjab Institute of Textile Technology	Amritsar	Punjab	Diploma in Textile Technology
23	Jayoti Vidyapeeth Women's University	Jaipur	Rajasthan	Diploma in Garment Engineering
24	Annai J.K.K Sampoorani Ammal Polytechnic College	Erode	Tamil Nadu	Diploma in Textile Technology Diploma in Garment Engineering
25	Annamalai Polytechnic College	Villupuram	Tamil Nadu	Diploma in Textile Technology
26	E.I.T Polytechnic College	Erode	Tamil Nadu	Diploma in Textile Technology
27	Elumalai Polytechnic College	Villupuram	Tamil Nadu	Diploma in Textile Technology
28	G.R.G Polytechnic College	Coimbatore	Tamil Nadu	Diploma in Textile Technology Diploma in Garment Engineering
29	GandhiGram Rural Institute	Dindigul	Tamil Nadu	Diploma in Textile Technology
30	Gomathi Ambal Polytechnic College	Tirunelveli	Tamil Nadu	Diploma in Textile

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Sl. No.	Name of Institution	District	State	Course Offered
<b>Institutions, Polytechnic, ITIs offering diploma in textile field</b>				
				Technology
31	Institute of Textile Technology	Chennai	Tamil Nadu	Diploma in Textile Technology Diploma in Textile Manufacturing Technology
32	Karpagm Polytechnic College	Coimbatore	Tamil Nadu	Diploma in Textile Technology
33	Latha Mathavan Polytechnic College	Madurai	Tamil Nadu	Diploma in Textile Technology
34	Nachimuthu Polytechnic College	Coimbatore	Tamil Nadu	Diploma in Textile Technology
35	Nanjappa Institute of Technology	Coimbatore	Tamil Nadu	Diploma in Textile Technology
36	Nanjappa Polytechnic College	Coimbatore	Tamil Nadu	Diploma in Textile Technology
37	P.A.C Ramasamy Raja Polytechnic College	Virudhnagar	Tamil Nadu	Diploma in Textile Technology Diploma in Garment Engineering
38	P.S.G Polytechnic College	Coimbatore	Tamil Nadu	Diploma in Textile Technology
39	Pasumpon Nethaji Polytechnic College	Tirunelveli	Tamil Nadu	Diploma in Textile Technology
40	Periyar University	Salem	Tamil Nadu	Diploma in Textile Technology
41	Ratnavel Subramaniam Polytechnic College	Dindigul	Tamil Nadu	Diploma in Textile Technology
42	Rudhraveni Muthuswamy Polytechnic College	Tirupur	Tamil Nadu	Diploma in Textile Technology
43	Rukmani Shanmugam Polytechnic College	Madurai	Tamil Nadu	Diploma in Textile Technology
44	S.S.M Institute of Textile Technology and Polytechnic	Namakkal	Tamil Nadu	Diploma in Textile Technology
45	Shri Raghvendra Polytechnic College	Namakkal	Tamil Nadu	Diploma in Textile Technology Diploma in Garment Engineering
46	Sri Sowdambika Polytechnic College	Virudhnagar	Tamil Nadu	Diploma in Textile Technology
47	Subramaniam Polytechnic College	pudukottai	Tamil Nadu	Diploma in Textile Technology
48	Dr. Dharambal Govt. Polytechnic College for Women	Chennai	Tamil Nadu	Diploma in Garment Engineering
49	V.S. VellaiChamy Nadar Polytechnic College	Virudhnagar	Tamil Nadu	Diploma in Garment Engineering
50	Government Polytechnic	Kanpur	Uttar Pradesh	Diploma in Textile Technology

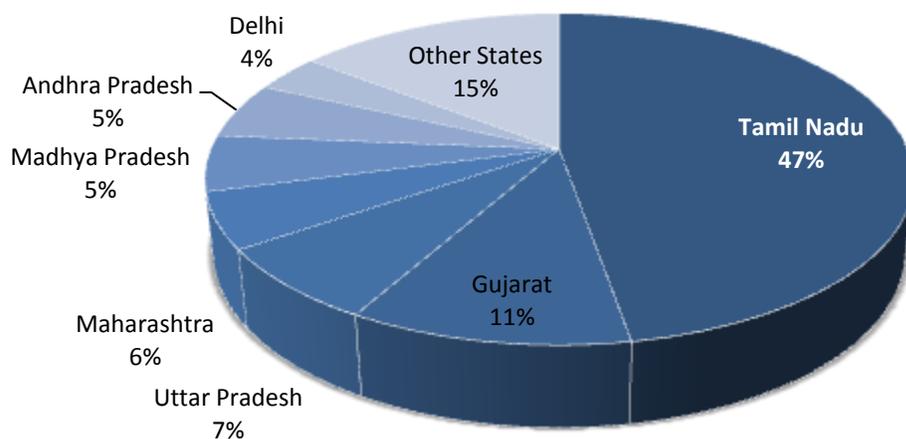
Sl. No.	Name of Institution	District	State	Course Offered
<b>Institutions, Polytechnic, ITIs offering diploma in textile field</b>				
51	Government Girls Polytechnic, Gorakhpur	Gorakhpur	Uttar Pradesh	Diploma in Textile Technology
52	S.D. Polytechnic	Muzaffarnagar	Uttar Pradesh	Diploma in Garment Engineering
53	Seth Jai Prakash Mukund Lal Girls Polytechnic	Ghaziabad	Uttar Pradesh	Diploma in Garment Engineering

Source: Secondary sources

A majority of these institutes are clustered in Tamil Nadu. The state wise distribution of different ITIs and polytechnics offering diploma courses in textile is as shown in the exhibit below:

Exhibit D-29: State wise distribution of polytechnics offering textile courses

**State wise distribution of Diploma offering institutes  
( Total - 53)**



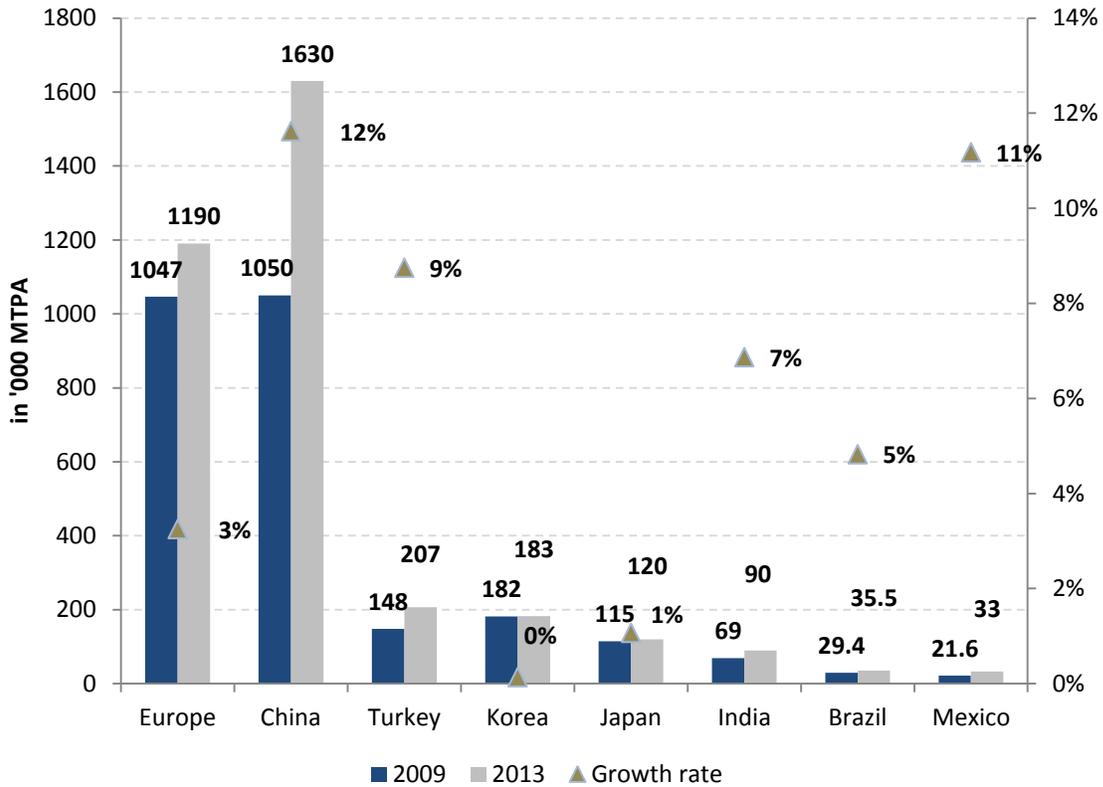
Source: IMAcS analysis

## 6. Competitive Assessment of India vis-a-vis other countries

Europe and China are the largest manufacturers of technical textile product together accounting for more than 50% of the production. While the production in Europe is stagnant for the last few years, China is rapidly building capacity for production of technical textile products. Other than these, key

manufacturers of technical textile are Korea, Japan, Turkey, India, Mexico and Brazil. India accounts for less than 5% of the world technical textile production. While technical textile industry in Europe is stagnant, China, Turkey and Mexico have grown at a very goods rate during the last five years. The production of Technical textiles across major countries is as follows:

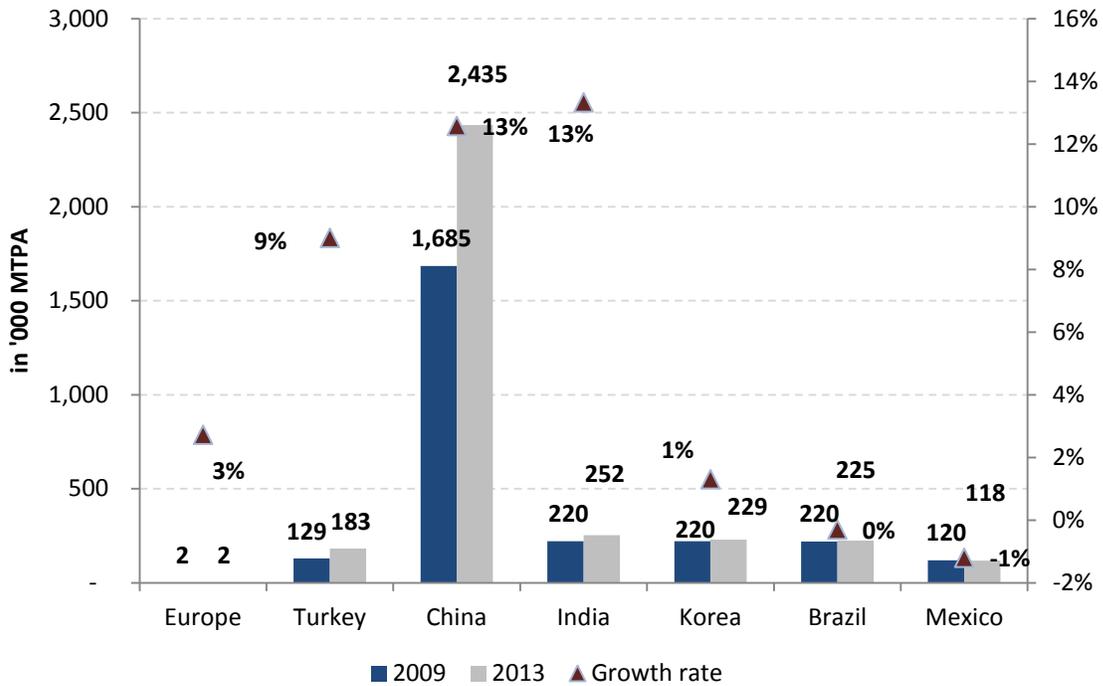
Exhibit D-30: Fibre consumption for production of technical textile fibre across major countries



\*source: Report on world market technical textile by CIRFS

In the last few years, globally the manufacturing of non-woven has increased with better awareness about the benefits of the same. India accounts for about 6% of world’s non woven production. China is world’s largest non –woven producer accounting for close to 60% of world production. The major manufacturing locations for non woven are China, India, Korea, Brazil and Mexico. During the last five years only India and China have seen high growth rate in production of non-woven fabric, while investment in most other developing countries has been insignificant. The production of non woven at major locations across the world can be seen as under:

Exhibit D-31: Production of non woven across major countries



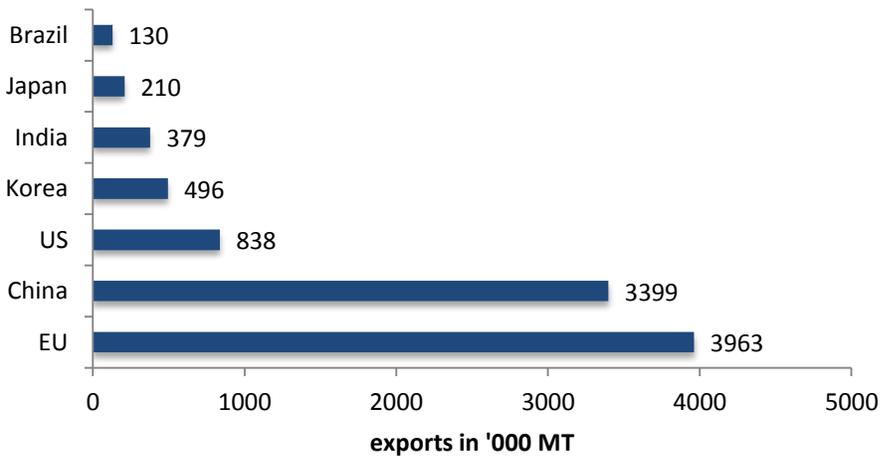
\*source: Report on world market technical textile by CIRFS, IMAcS analysis

### International trade

European Union (EU) is the largest exporter of technical textile in the world closely followed by China. India accounts for roughly 4% of exports of technical textile world over. The details of export and imports of technical textile are as shown in the exhibit below.

Exhibit D-32: Export of technical textile in the world - 2010

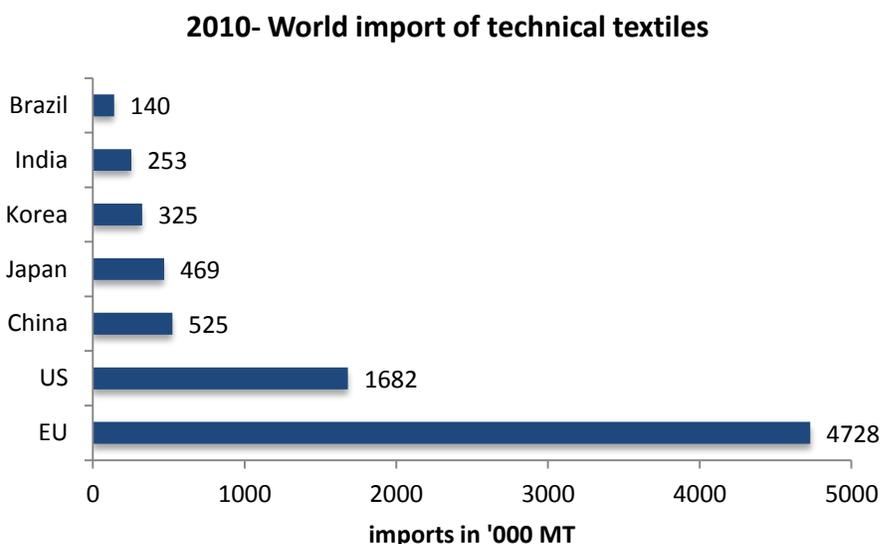
### 2010- World export of technical textiles



Source: Report on world market technical textile by CIRFS

On the import side, EU and US are the largest importers accounting for close to 70% of imports of technical textile. Europe is the largest player in technical textile foreign trade having a major share in both exports and imports. The major importers of technical textile are as shown in the exhibit below.

Exhibit D-33: Major imports of technical textiles - 2010



Source: Report on world market technical textile by CIRFS

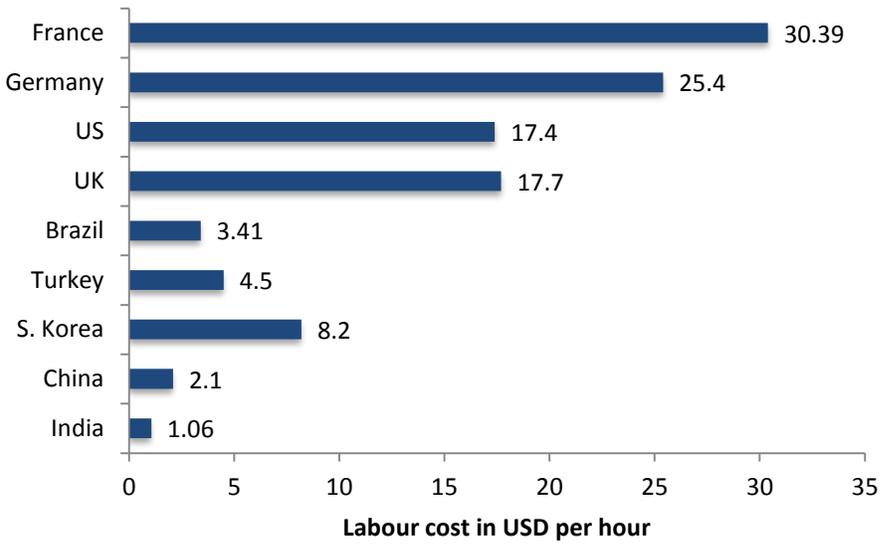
### Country wise factor analysis

The major factors incentivising investment and production of technical textiles are easy availability of raw material, cheap labour force goods promotional policies and low power tariffs. Comparison of India with respect to major developing countries involved in technical textile industry is as follows:

### *Comparison of labour cost*

India is one of the places with cheapest labour when it comes to technical textile industry. Given the fact, that many segments of technical textile industry require lot of manual labour in form of stitching and weaving, cheap labour acts as a substantial benefit over other countries in particular China. Labour cost across major countries is as shown

Exhibit D-34: Average labour cost across countries

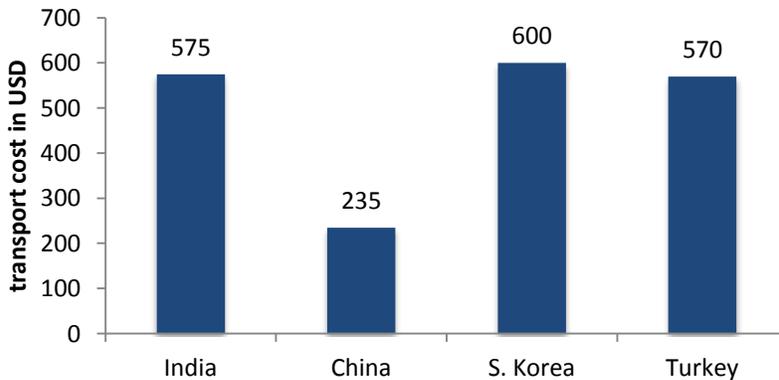


Source: Werner International, IMAcS Analysis

### Comparison of Transportation cost

Technical textile industry across the world is staggered, with Asia leading in exports and US and EU leading in consumption and imports. Therefore for most countries involved in foreign trade of technical textile, the transport cost incurred becomes a major factor while importing products. Unlike labour, the transport and handling cost at Indian ports is relatively on a higher side when compared to other countries. China enjoys a lucrative position here with total transport and handling cost at ports at just about 1/ 3<sup>rd</sup> of other major suppliers. The detail of the transport and handling cost at ports is as shown in the exhibit below.

Exhibit D-35: Average handling and transport cost at ports in USD



Source: World bank, IMAcS Analysis

### ***Comparison of availability of raw material***

One of the prime factors determining the growth of technical textile industry in a country is the easy availability of raw materials. India and China enjoy a very lucrative position when it comes to availability of raw material due to a flourishing indigenous textile industry. India and China are amongst the largest producers of both man-made and natural fibres which give a strategic edge of availability of cheap and regular supply of key raw materials. Comparison on the same front can be seen as under:

**Exhibit D-36: COEs present in India**

Raw Material	India	China	South Korea	Japan	EU	Turkey	Latin America
<b>Production</b>							
Man- made fibres	High	Very high	Moderate	Low	Moderate	Moderate	Low
Natural Fibres	High	Very High	Low	High	Low	Low	Low
<b>Dependency on import</b>	<b>Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>High</b>	<b>Moderate</b>	<b>High</b>

### ***2012 International Top 40 Non-woven Companies***

The top 40 international companies by sales value are mentioned in the below table:

S.No	Company	Sales(2012)
<b>1</b>	Freudenberg	\$ 1.48 Billion
<b>2</b>	Dupont	\$ 1.35 Billion
<b>3.</b>	Kimberly-Clark Corporation	\$ 1.25 Billion
<b>4</b>	PGI	\$ 120 million
<b>5</b>	Ahlstrom Corporation	\$ 106 million
<b>6</b>	Johns Manville Corporation	\$ 670 million
<b>6</b>	Fitesa company	\$ 670 million
<b>8</b>	Glatfelter	\$ 538 million
<b>9</b>	Fiberweb company	\$ 465 million
<b>10</b>	Avgol	\$ 329 million
<b>11</b>	Sandler AG Sandler AG	\$ 311 million
<b>12</b>	Hollingsworth & Vose (H & V) Hayes-Group (H & V)	\$ 300 million
<b>13</b>	Japan Vilene	\$ 263 million
<b>14</b>	Companhia Providencia	\$ 260 million
<b>15</b>	First Quality Nonwovens	\$ 250 million
<b>16</b>	Asahi Kasei	\$ 246 million

17	Buckeye Technologies	\$ 239 million
18	Fibertex Personal Care A / S Fibertex Personal Care A / S	\$ 229 million
19	Toray Advanced Materials Advanced Materials	\$ 224 million
20	Mitsui Chemicals Mitsui Chemicals	\$ 219 million
21	Colbond company	\$ 210 million
22	Pegas Nonwovens PEGAS Nonwovens	\$ 203 million
23	Jacob Holm Industries Jacob Holm	\$ 192 million
24	Union Industries	\$ 184 million
25	Toyobo	\$ 164 million
26	Vita Nonwovens	\$ 159 million
27	Georgia-Pacific	\$ 152 million
28	Andrew Industries	\$ 150 million
28	Textilgruppe Hof	\$ 150 million
30	Propex Holdings	\$ 140 million
31	Lydall Company	\$ 134 million
32	Precision Custom Coatings	\$ 132 million
33	Suominen Nonwovens Suominen Nonwovens	\$ 131 million
34	Hassan Group Group	\$ 128 million
35	Fibertex Nonwovens A / S Fibertex Nonwovens A / S	\$ 126 million
36	Unitika Unitika	\$ 122 million
37	The Jofo Group	\$ 120 million
38	Nan Liu Enterprise South six corporate NEW	\$ 118 million
39	Spuntech	\$ 113 million
40	Kuraray	\$ 112 million
41	KNH	\$ 100 million
42	Dounor Nonwovens	\$ 92 million

Source: Taiwan nonwoven fabrics industry association

### **Products being used in other countries but not in India**

As the technical textile industry of India is still in its growing phase especially in the segments of geo-tech, agro-tech and meditech, there are few products that are yet to come to Indian markets. Some of the key products that can have a potential market in India are:

#### ***Silage bags***

India has one of the largest cattle populations in the world, making it one of the leading countries in milk production. However, the dairy industry of India is highly un-organised and traditional in approach with

share of organised industry limited to just 6.5% of the industry. Most of the production is carried out in villages and small dairy sheds at sub-urban locations.

The industry faces the issue of poor milk yield, which is less than 50% of the average yield around the world. It is because the cattle is given dry fodder for most of the year, as the period for cultivation of green fodder is limited to just a few months. Indian government has been actively involved in promoting storage of this green fodder through underground-silos and bunkers.

In light of this, silage bags which are polypropylene bags can provide significant breakthrough for the industry as they can store green fodder for long periods up to three years. Silage bags is a new technology that is fast catching up in Indian markets and is expected to become a significant part of the technical textile industry in coming years. The main benefits of using silage bags are:

- Lower cost as compared to concrete or brick silos
- Higher quality of silage
- Low storage losses due to spoilage
- Longer storage of green fodder
- Bags can be easily transported as compared to fixed concrete silos
- They are available in all sizes from 50 kg to 500 kg capacity. Hence, farmers based on their requirement and financial capacity can go for the preferred silage bag

Silage bags are yet to catch up in India. Currently Reliance is producing FIBC silage bags along with few other manufacturers located primarily in Gujarat like Saurya Polypack.

### ***Disposable drapes for Medical use***

Hospital acquired infections (HAI) are bacterial or fungal infections that are difficult to cure due to the antibiotic resistance developed by the microbe due to continuous exposure to hospital environments using antibiotic. As a result, these infections prove to be very serious and difficult to control making prevention of occurrence or spread of such diseases the best option. A major factor responsible for spread of HAIs is soiled linen. Therefore, disposable anti bacterial medical textiles are used in most of the developed countries to prevent spread of HAIs.

HAI occurrence in developed countries is on a lower side varying from 3% to 12% while the occurrence in developing countries ranges from 6% to 19%, making HAI a major cause of hospital deaths. In India,

the occurrence of HAI is around 25%, making it a very serious threat. A major reason behind this is poor management of hospitals and patient care apparatus and clothing. Disposable textiles for medical use can be a major breakthrough in Indian medical care scenario as it would inhibit growth and spread of HAIs, making the hospitals a lot safer.

Disposable curtains, bed sheets and pillows are commonly used in hospitals and nursing homes around the world to prevent spread of infection. Disposable drapes and textiles used for medical purposes include curtains, bed sheets, towels, clothing, and pillows. They have a life of close to one year; however, it is recommended that they be replaced at any outbreak of infection.

These are manufactured from a durable, disposable, and completely recyclable polypropylene fabric which inhibits bacteria growth. These can be made from both woven PP and non woven PP. However use of non-woven is preferred around the world due to its cheaper cost. These have the following crucial benefits which make them suitable for use in hospitals:

- Anti-bacterial
- Waterproof
- Recyclable
- Cheaper when compared to woven textile

Major manufacturers of disposable textiles around the world are Haines Medical in Australia, Global Medics in New Zealand and Opal disposables.

### ***Silt bags***

Silt bags are basically sediment control bags which have the technical properties of retaining the sediments while letting out water due to its microporous construct. The Silt Bag is designed to filter water. These bags are mostly made of durable geotextile filter fabric usually of non woven.

These bags due to its water filtering capabilities find application across construction industry for different purposes. Key applications of silt bags are:

- It is used as filtering device for filtering waste water from construction sites and storage sites. The water often contains a lot of toxic and chemical waste which cannot be directly released in the environment. Hence the water is released using a silt bag, which lets out the water while retaining the waste.

- Removal of silt from water bodies: Silt removal keeps the water bodies fresh and usable. Silt bags are often laid on the shores of water bodies where the water is pumped into the bags using a pump. Once through the bag, the silt is retained and the clean water seeps out. The silt stored can be used for any landscaping requirement.

The silt bags find application as dirt bag to remove waste and also as a silt fence to prevent silt from entering a water body.

***The key players in silt bag across the world are Reed and Graham Geosynthetics, Granite Environmental and ACF environmental.***