

# Technical Textiles

## What is Technical Textile?

Textile product manufactured primarily for its performance and functional properties rather than aesthetic or decorative characteristics

## Some of the common products of technical textiles are:-

- ✓ Seat-belts
- ✓ Airbags
- ✓ Nylon tier cord fabrics
- ✓ Seat covers
- ✓ Car-body covers
- ✓ Automobile interiors carpets
- ✓ Helmets
- ✓ Insulation felts
- ✓ Sanitary napkins
- ✓ Diapers
- ✓ Surgical dressings
- ✓ Healthcare textiles
- ✓ Footwear components
- ✓ Sleeping bags
- ✓ Ballooning fabrics
- ✓ Parachute fabrics
- ✓ Fire-retardant fabrics
- ✓ Fire-retardant upholstery
- ✓ Ballistic protective clothing
- ✓ Bullet-proof jackets
- ✓ Hoses
- ✓ Ropes
- ✓ Dry belts
- ✓ Computer ribbons
- ✓ Battery separators
- ✓ Filters
- ✓ Decatising cloth
- ✓ Bolting cloth
- ✓ Applications in construction industry
- ✓ Shoe laces
- ✓ Narrow-width fabrics
- ✓ Hoardings
- ✓ Awnings
- ✓ Canvas
- ✓ Tarpaulin
- ✓ etc...

# SEGMENTS OF TECHNICAL TEXTILES



## Agro – tech

Agriculture, horticulture and forestry



## GEO – tech

Geotextiles, civil engineering



## BUILD – tech

Building and construction



## HOME – tech

Components of furniture, household textiles and floor coverings



## CLOTH – tech

Technical components of shoes and clothing



## INDU – tech

Filtration, cleaning and other industrial usage



## MEDI – tech

Hygiene and medical



## PACK – tech

Packaging



## MOBIL – tech

Automobiles, shipping, railways and aerospace



## PRO – tech

Personal and property protection



## OEKO – tech

Environmental protection



## SPORT – tech

Sport and leisure

# MATERIALS FOR TECHNICAL TEXTILES

## 1. Regular/Generic fibers

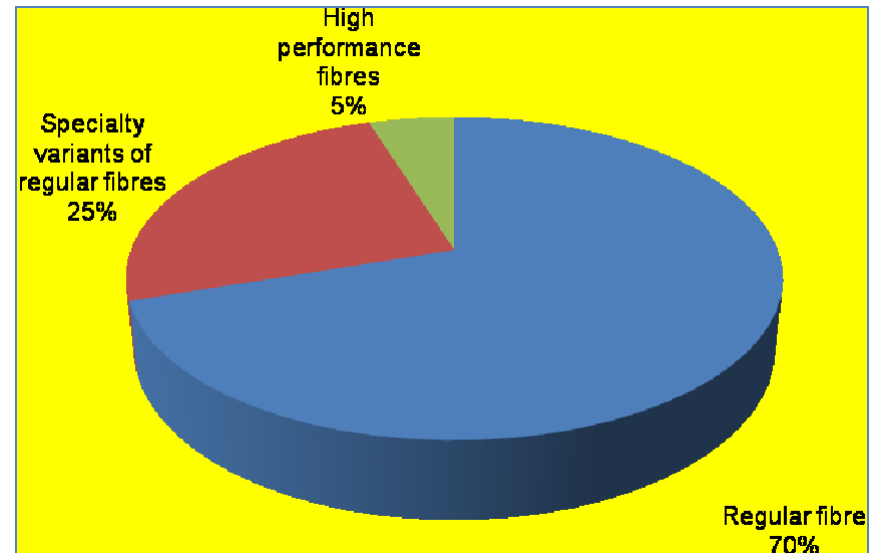
- Natural fibers: Cotton, silk, wool, jute, hemp, ramie, flax
- Regenerated fibers: Viscose, Lyocell.
- Synthetic fibers: Nylon, PET, PP, Acrylic.

## 2. Specialty variants of regular/generic fibers

- Flame retardant
- Super absorbent
- Antimicrobial
- Ultra fine fibers. etc.

## 3. High tech/high performance fibers:

- High chemical- and combustion-resistant organic fibres: Nomex, Kevlar
- High performance inorganic fibres: Glass, Asbestos, Carbon



# Generic Fibers

Fibre Type	Fabric Structure	Application
Cotton, polyester fibre, polypropylene fibre,	Woven, nonwoven	Surgical gowns
Viscose	Nonwoven	Surgical caps
Viscose, polyester fibre, glass fibre	Nonwoven	Surgical masks
Polyester fibre, polyethylene fibre,	Woven, nonwoven	Surgical drapes, cloths
Cotton, polyester fibre, polyamide fibre, elastomeric-fibre yarns	Knitted	Surgical hosiery
Cotton, polyester fibre	Woven, knitted	Blankets
Cotton	Woven	Sheets, pillowcases
Cotton, polyester fibre	Woven	Uniforms
Polyester fibre, polypropylene fibre	Nonwoven	Protective clothing, incontinence, diaper/sheet, coverstock
Superabsorbent fibres, wood pulp,	Nonwoven	Absorbent layer
Polyethylene fibre,	Nonwoven	Outer layer
Viscose, lyocell	Nonwoven	Cloths/wipes

## HIGH-TECH FIBRE

Fiber	Characteristics	Applications	Key players
Meta Aramid (Nomex)	Heat Resistance, high strength and high impact absorbing capacity	Fire retardant apparel, bullet proof jackets, helmets, gloves etc.	Dupont (USA), Teijin Twaron (Japan), SRO Group (China), Yantai Spandex (China), Kermel (France)
Para Aramid (Kevlar)	High strength to weight ratio, Excellent thermal & chemical stability	Fire retardant apparel, bullet proof jackets, helmets, gloves etc.	Dupont (USA), Teijin Twaron (Japan), Yantai Spandex (China)
Carbon	Low weight and high strength	Air craft body, wind mill wings, racing cars.	Toray Industries (Japan), Toho Tenax (Japan), Mitsubishi Rayon (Japan), Zoltek (USA), Hexcelcorp (USA), SGL Carbon AG (Germany) , Kemrock (India)
Polyphenylene sulfide Fibres (PPS)	Highly resistance to heat, acid and alkaline	Electrical products, liquid filters, dryer canvas.	Armoco Fabrics & Fibres Co (USA), Toyobo (Japan), Toray Industries (Japan), etc
Glass fiber	Thermal insulation properties with high strength and low elongation.	Automotive bodies, hockey sticks, boats, surfboard etc.	Owens-Corning Fibreglas, Nicofiber (USA), Fibreglass (Canada), Asahi Fibre Glass Co (Japan), Chemitex-Anilana (Poland), Owens Corning , Goa glass, Twiga (india)

## HIGH-TECH FIBRE

Fiber	Characteristics	Applications	Key players
Polytetrafluoroethylene (PTFE)	Excellent dielectric properties, high melting point.	Nonstick coating of pans, laboratory containers, magnetic stirrer.	DuPont (USA), Newton Filaments, Inc (USA), Albany International Inc. (USA), Toyobo (Japan)
Phenolic fiber	High strength	Automotive and electrical components.	Phenco (USA), The Vermont Organic Fiber Company (USA)
Conductive fiber	Electric conductive	Military garments, intelligent garments.	Shakespeare Conductive Fibres LLC and Bekaert, Bakaert India (India)
PBI (Polybenzimidazole)	High strength and does not burn or melt.	Automotive parts, aircraft parts, insulation shield etc.	Celanese Acetate
Alginate fiber	Highly absorbent	Wound dressing, textile printing etc.	Speciality Fibres and Materials Ltd (UK), FMC Biopolymer (USA), Degussa Texturant Systems (Germany), Danisco Cultor (Denmark), Kimica Corporation (Japan), China Seaweed Industrial Association (China)
PBO fiber-Zylon	Highest strength among fibers.	Protective clothing and equipments.	Toyobo Co. Ltd. (Japan)



# **SEGMENT WISE CONSUMPTION OF FIBRES**



# **CLOTHTECH**

**CLOTHTECH = CLOTH + TECH  
FOR SPECIFIC FUNCTIONAL  
APPLICATIONS IN GARMENTS  
AND SHOES, LARGELY HIDDEN**

**EXAMPLES: INTERLINKS IN  
SHIRTS, SEWING THREADS, SHOE  
LACES, LABELS, HOOK AND LOOP  
FASTENERS (VELCRO),  
UMBRELLA CLOTH ETC.**

# APPLICATIONS OF Clothtech

(en.wikipedia.org)



**Shoe laces**

(tradekorea.com)



**Umbrella cloth**



**Interlinks**

(shahtrim.com)



(threadtheory.ca)



**Elastic narrow fabric**

(technicaltextile.net)



**Zip fasteners**

**Sewing Thread**

(embossingtapsuppliers.com.au)



**Velcro**



# HOMETECH

**HOMETECH = HOME + TECH  
TECHNICAL TEXTILES FOR HOME  
OR HOUSEHOLD APPLICATIONS.**

**EXAMPLES: BLINDS, FILTER  
PRODUCTS USED IN VACUUM  
CLEANERS, FURNITURE PRODUCTS,  
STUFFED TOYS, FIBERFILL,  
MOSQUITO NETS, CARPET BACKING  
CLOTH, MATTRESSES AND PILLOW  
COMPONENTS**

# APPLICATIONS OF HOMETECH

(xuhusyh.besthostingpro.com)



(www.loomandleaf.com)

**Pillow**

**Stuffed  
toys**



(crafthubs.com)



**Carpet backing**

(www.midwestfiltration.com)



**HVAC Filters**



**Fibrefill**

(www.dir.indiamart.com)



(www.kingsmarablinds.com)

**Blinds**



# GEOTECH

**GEOTECH= GEO + TECH**

**TECHNICAL TEXTILE USED IN SOIL (INCLUDING ROCK) FOR SPECIFIC APPLICATIONS TO IMPROVE BEARING CAPACITY, FILTRATION, DRAINAGE, AS REINFORCEMENT, OR PREVENT INTERMIXING OF TWO ADJOINING MATERIALS.**

**EXAMPLES: GEOTEXTILES, GEOGRIDS, GEONETS, GEOMEMBRANES, GEOCOMPOSITES, GEODRAINS ETC.**



# APPLICATIONS OF geotech



(ginninonwoven.com)



(jpnoven.com)



(nilex.com)



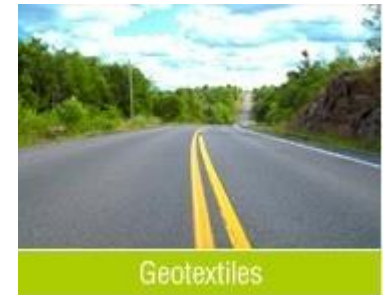
(www.layfieldgroup.com)



(www.geofabrics.com.au)

# Geo textiles — Geotextiles and civil engineering materials

- Jute, coir, Polypropylene, Polyester, Polyethylene, polyvinyl chloride, Polyamide, Aramids









# INDUTECH

INDUTECH = INDU + TECH

TECHNICAL TEXTILES USED IN THE  
INDUSTRIAL (MANUFACTURING)  
SECTOR.

EXAMPLES: CONVEYOR BELTS, DRIVING  
BELTS, CIGARETTE FILTER & RODS,  
DECATISING CLOTH, BOLTING CLOTH,  
ABSORPTION GLASS MATS, GLASS  
BATTERY SEPARATORS, ROPES AND  
CORDAGES, COMPOSITES, FILTRATION  
PRODUCTS, INDUSTRIAL BRUSHES ETC.

# INDUTECH

**Conveyor Belts**



([automatedconveyors.com](http://automatedconveyors.com))

**Ropes & Cordages**



([www.pinterest.com](http://www.pinterest.com))

**Cigarette filter rods**



([www.cigartepackagingpaper.com](http://www.cigartepackagingpaper.com))

**Decatising Cloth**



([indiamart.com](http://indiamart.com))

**Drive belts**



([www.eightballboards.co.uk](http://www.eightballboards.co.uk))



([hollisonsupply.co.uk](http://hollisonsupply.co.uk))

**Coated  
abrasive**



*meditech*

**MEDITECH = MEDI + TECH**  
**TECHNICAL TEXTILES USED IN**  
**MEDICAL APPLICATIONS (HYGIENE,**  
**HEALTH, PERSONAL CARE,**  
**SURGICAL APPLICATIONS).**

**EXAMPLES: BABY DIAPERS,**  
**INCONTINENCE DIAPERS, SANITARY**  
**NAPKINS, SURGICAL SUTURES,**  
**DISPOSABLES, SURGICAL**  
**DRESSINGS, ARTIFICIAL IMPLANTS**



# APPLICATIONS OF meditech



([www.dir.indiamart.com](http://www.dir.indiamart.com))

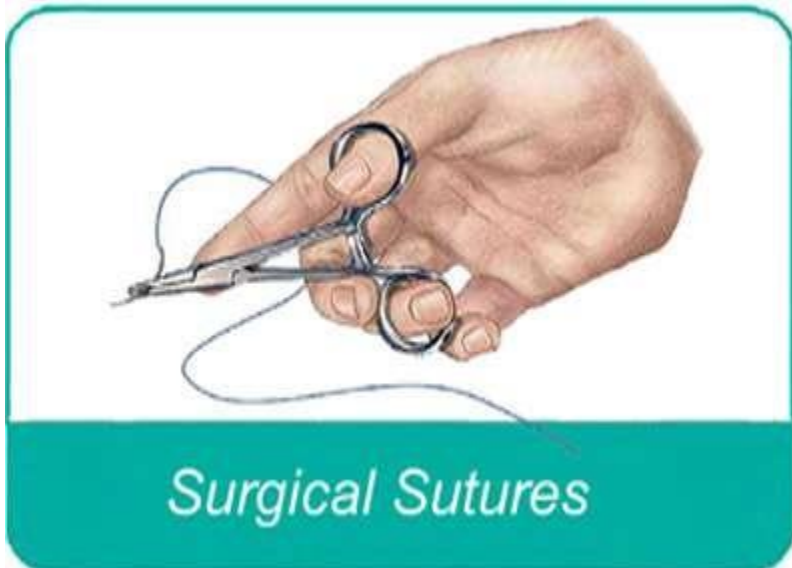
**Baby diapers**

**Incontinence  
diapers**

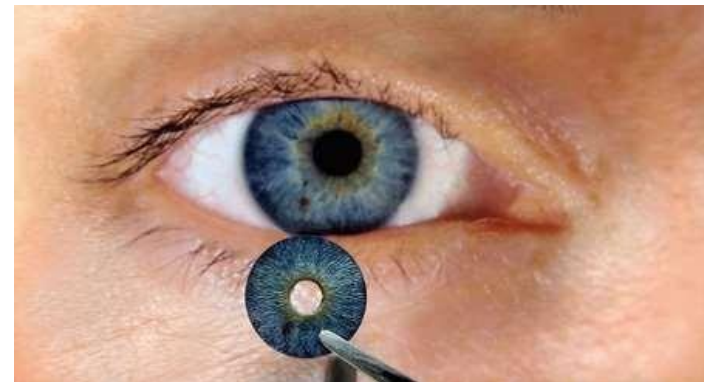


([www.aliexpress.com](http://www.aliexpress.com))

**Sanitary napkins**  
([www.diytrade.com](http://www.diytrade.com))



([www.fosunmedical.com](http://www.fosunmedical.com))



**Artificial  
Implants**

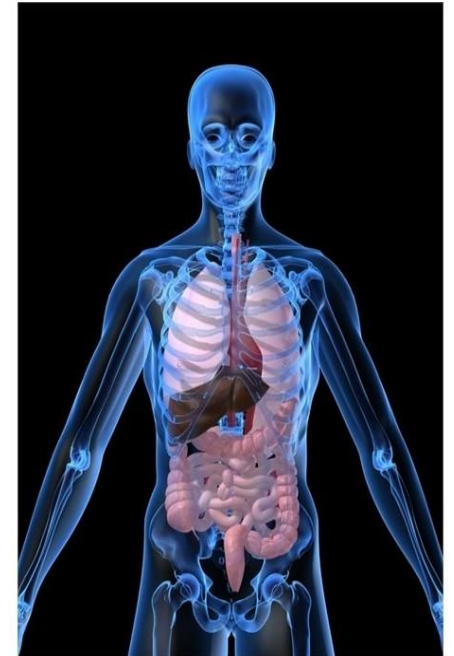
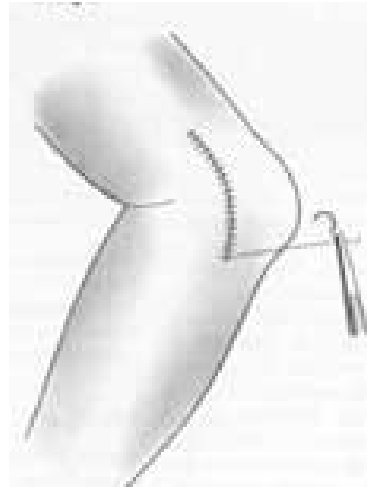
([www.ayrshireeyeclinic.com](http://www.ayrshireeyeclinic.com))

# Medical Textiles

- Hygiene and medical products
- Polyester, Cotton, polypropylene, silk etc...



Alloplastic cruciate ligament

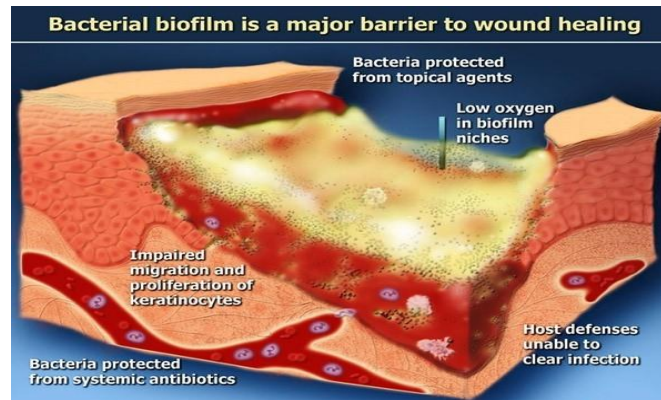


# Wound dressing

Chronic wounds: 6.5 million people - \$25 billion



Impaired healing – Inflammation stage is prolonged



Resistance to antibiotics



**Naturally derived compounds?**



Alternative metals, e.g. zinc as well as non-metal bactericides



Silver impregnated dressings





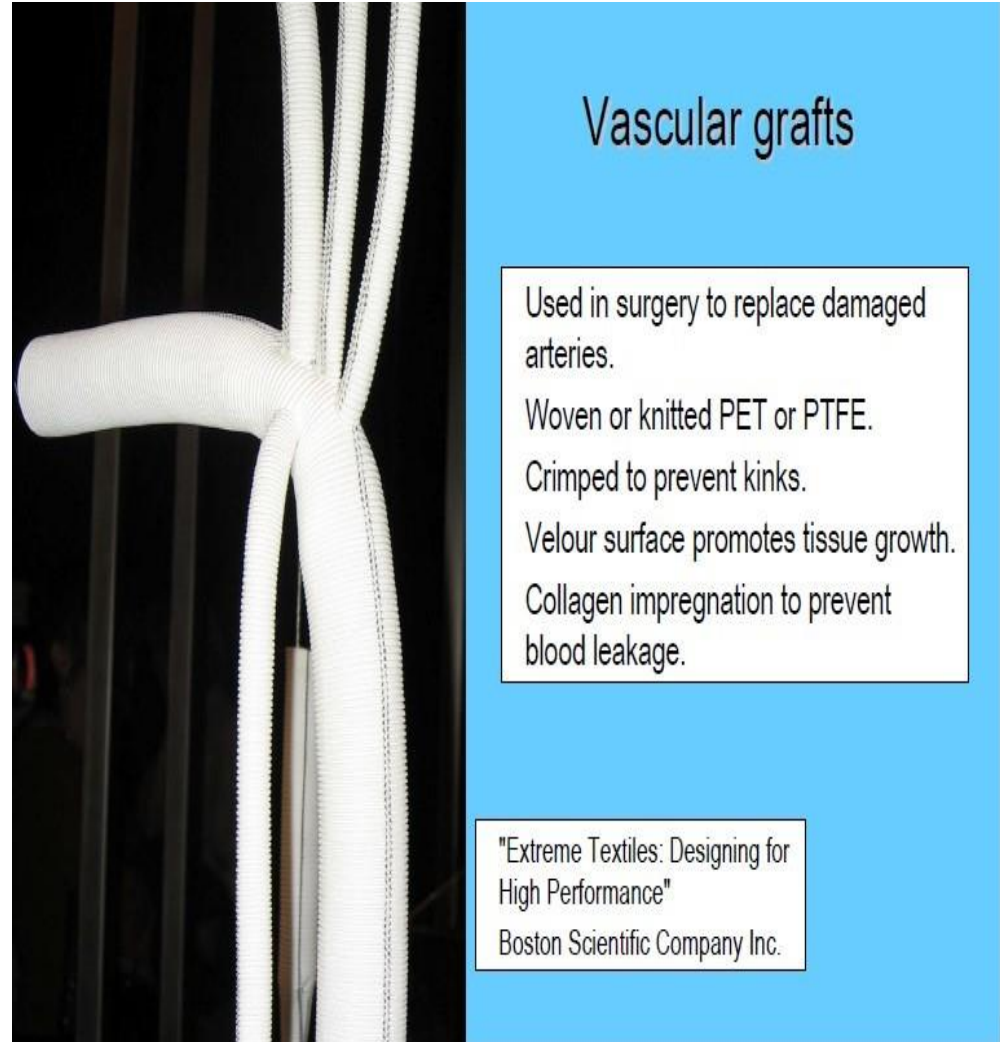
**Extracorporeal devices-** artificial kidney, liver, heart pacer and lung



Type Fibre	Application	Function
Hollow polyester fibre, hollow viscose	Artificial kidney	Remove waste products from patients' blood
Hollow viscose	Artificial liver	Separate and dispose of patients' plasma and supply fresh plasma
Hollow polypropylene fibre, hollow silicone membrane	Mechanical lung	Remove carbon dioxide from patients' blood and supply fresh oxygen



Implantable materials- sutures, vascular grafts, artificial ligaments, cartilages, artificial joints, heart valves etc



## Vascular grafts

Used in surgery to replace damaged arteries.

Woven or knitted PET or PTFE.

Crimped to prevent kinks.

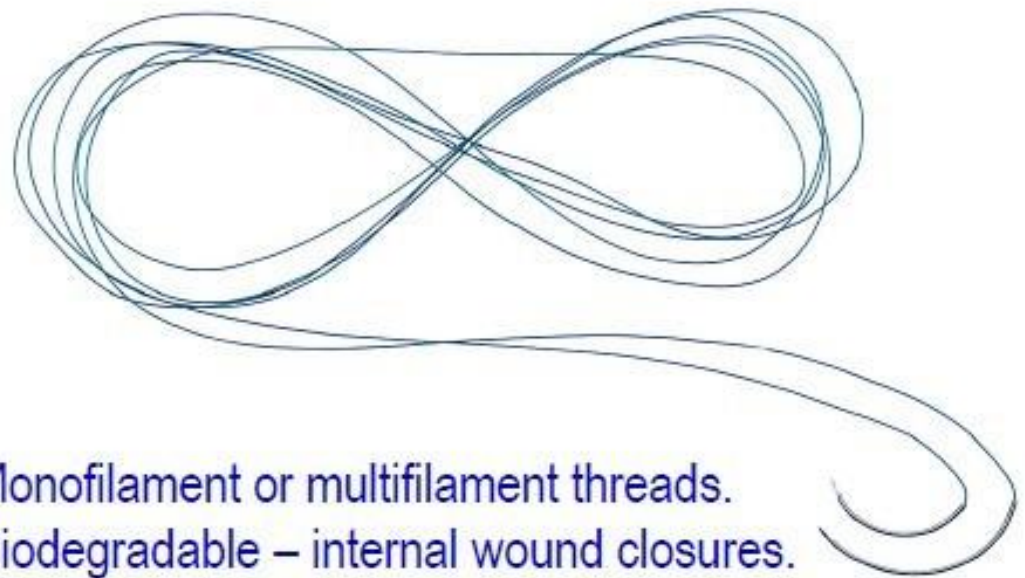
Velour surface promotes tissue growth.

Collagen impregnation to prevent blood leakage.

"Extreme Textiles: Designing for High Performance"

Boston Scientific Company Inc.

# Sutures



Monofilament or multifilament threads.  
Biodegradable – internal wound closures.  
Non biodegradable – external.  
Biocompatible.

# Application on the injured liver

Nanofibers stop bleeding and help healing.







# MOBILTECH

- **MOBILTECH = MOBIL + TECH**
- **TECHNICAL TEXTILES USED IN AUTOMOBILES AND THEIR COMPONENTS I/C RAILWAYS AND AIRCRAFTS.**
- **EXAMPLES: NYLON TYRE CORD, SEAT BELT WEBBING, AIRBAGS, CAR BODY COVERS, SEAT UPHOLSTERY, AUTOMATIVE CARPETS, HEADLINERS, INSULATION FELTS, SUNBLINDS.**

# APPLICATIONS OF *mobitech*

**Tyre cords**



**Air bags**



**Car body covers**



**Seat upholstery**



**Carpets**

# Protective Textiles

- Personal and property protection
- Nomex, kevlar fibers...



Granch Berhe 2015





# SPORTECH

- **SPORTECH = SPORT + TECH**
- **TECHNICAL TEXTILES USED FOR SPORTS AND LEISURE**
- **EXAMPLES: ARTIFICIAL TURF, PARACHUTE FABRICS, BALLOONING FABRICS, SAIL CLOTH, SLEEPING BAGS, SPORTS COMPOSITES (FOOTBALLS, VOLLEY BALLS, BASKET BALLS ETC)**



# APPLICATIONS OF SPORTECH

## ASTRO TURF



(depositphotos.com)



(en.wikipedia.org)

## Parachutes



(technicaltextile.com)

## Sleeping bags



(ilpentolino.com)



(balloonsunlimited.com) **B) aloons**



# Sport Textiles

→ Sport and leisure

E.g Yatcht, Hot air balloons...

→ Polyester, nylon, spandex, glass fibers.....





Granch Berhe 2015





# PACKTECH

- **PACKTECH = PACK + TECH**
- **TECHNICAL TEXTILES USED FOR PACKAGING**
- **EXAMPLES: WOVEN SACKS, LENO BAGS, JUTE HESSAIN SACKS, SOFT LUGGAGE PRODUCTS, TEABAGS**



# APPLICATION OF PACKTECH

(wovensacksbags.com)



Woven sacks

(wovensacks.net)



Leno bags



(idearibbon.com)

(blog.enn.com)



(missisystems.com)

Flexible Intermediate Bulk Containers



(bagittoday.com)

# Packaging Textiles

→ Packaging materials

→ Polyethylene, polypropylene, glass fibers.....



Granch Berhe 2015

# Transportation Textiles

- Automobiles, shipping, railways and aerospace
- Polyester, nylon, glass, UHMWPE, aramids compsites, carbon fibers...





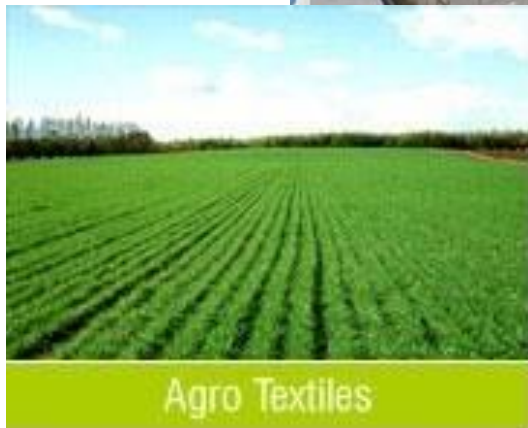
# AGROTECH

- **AGROTECH : AGRO + TECH**  
**TECHNICAL TEXTILES USED IN**  
**AGRICULTURE (INCLUDES**  
**HORTICULTURE, FISHERIES AND**  
**FORESTRY).**
- **INCLUDES SHADE NETS, MULCH**  
**MATS, CROP COVERS, FISHING**  
**NETS, ANTI HAIL NETS, BIRD**  
**PROTECTION NETS.**



# Agro Textiles

- Agriculture, horticulture, forestry and aquaculture textiles
- Polypropylene, polyester, polyethylene etc.....







# BUILDTECH

**BUILDTECH = BUILD +TECH**

**TECHNICAL TEXTILES USED IN  
CONSTRUCTION OF BUILDINGS /  
STRUCTURES.**

**EXAMPLES:            ARCHITECTURAL  
MEMBRANES,        HOARDINGS AND  
SIGNAGES, TARPULINS, AWNINGS,  
SCAFFOLDING NETS ETC.**

# APPLICATIONS OF BUILDTECH



(prlog.org)

**Architectural membranes**



(globaladvertisers-outdooradvertisers.blogspot.com)

GOREGAON

**Hoardings**



(indiamart.com)

**Scaffolding nets**



(lamifab.com)

**Tarpaulins**



(dragontarpaulin.com)



(suncontrolproducts.com)

**awnings**



# OEKOTECH

- **OEKOTECH = ECO + TECH**
- **TECHNICAL TEXTILES USED FOR ECOLOGICAL/ENVIRONMENTAL FUNCTIONS**
- **EXAMPLES:**  
**MEMBRANES/COMPOSITES/CLAY LINERS USED FOR LANDFILL/CHEMICAL WASTE MANAGEMENT/HAZARDOUS WASTE.**

# APPLICATIONS OF Oekotech

(Environmental Protection)

([www.alibaba.com](http://www.alibaba.com))



([www.layfieldgroup.com](http://www.layfieldgroup.com))





# Eco textile Textiles

- Environmental protection
- Carbon fibers.....



## Summary of Segment wise consumption of different fibres

	Cotton	Jute	Viscose	PET	Nylon	PP	HDPE	LDPE/ LLDPE	Aramid	Glass	Carbon
Agrotech	✓	✓		✓	✓	✓	✓	✓			
Meditech	✓		✓	✓		✓					
Mobiltech			✓	✓	✓	✓	✓				
Packtech	✓	✓	✓	✓	✓	✓	✓	✓			
Sporttech	✓		✓	✓	✓	✓	✓	✓			
Buildtech	✓			✓	✓	✓	✓				
Clothtech	✓		✓	✓	✓	✓					
Homotech	✓		✓	✓		✓					
Protech				✓	✓				✓		✓
Geotech		✓		✓	✓	✓		✓			
Oekotech		✓		✓	✓	✓	✓	✓			
Inditech	✓		✓	✓	✓	✓	✓		✓	✓	

# APPLICATION STAGES OF TECHNICAL TEXTILES

- Fiber stage
- Yarn stage
- Fabric stage
- Wet processing stage
- Technology at fibre, yarn, fabric and end conversion stage