T-Pot Workshop Technical Textiles & Textile Recycling 30 Nov – 04 Dec 2009 – Chemnitz (DE)

An introduction in Technical Textiles

Romy Naumann
Saxon Textile Research Institute
Overview

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2. Technical textiles - Fields of application
   2.1 Industrial textiles
   2.2 Mobile textiles
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   2.5 Agrotextiles
   2.6 Geotextiles & ecological applications
   2.7 Textiles for building and civil engineering

3. R&D in Technical Textiles at STFI

1. Definitions

Definition: Technical Textiles

Technical approach: Technical textiles are textile materials and products mainly produced for their technical function and performance; their aesthetic or decorative properties are of secondary importance.

Market approach: Technical textiles offer solutions for the manifold technical challenges existing in our society (environmental protection, personal safety, general safety, health & well-being).

Source: EURATEX Working group „Technical textiles“
1. Definitions

Classification (Techtextil Fair Frankfurt)

- Agrotech
- Geotech
- Medtech
- Packtech
- Buildtech
- Hometech
- Mobiltech
- Protech
- Clothtech
- Indutech
- Oekotech
- Sporttech

1. Statistics

Worldwide consumption of technical textiles

1. Statistics

**Worldwide consumption of technical textiles**

![Graph showing consumption of technical textiles worldwide](image)


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1. Statistics

**Growth rates of end-use consumption (worldwide)**

<table>
<thead>
<tr>
<th>Application areas</th>
<th>2000 – 2005 % per year</th>
<th>2005 – 2010 % per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geotech</td>
<td>4.6</td>
<td>5.3</td>
</tr>
<tr>
<td>Buildtech</td>
<td>4.3</td>
<td>5.0</td>
</tr>
<tr>
<td>Indutech</td>
<td>3.5</td>
<td>4.4</td>
</tr>
<tr>
<td>Medtech</td>
<td>4.6</td>
<td>4.3</td>
</tr>
<tr>
<td>Protech</td>
<td>3.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Agrotech</td>
<td>3.2</td>
<td>3.9</td>
</tr>
<tr>
<td>Packtech</td>
<td>3.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Sporttech</td>
<td>3.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Mobiltech</td>
<td>2.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Clothtech</td>
<td>2.7</td>
<td>3.2</td>
</tr>
<tr>
<td>Hometech</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td>3.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

1. Statistics

End-use consumption in Western Europe


End-use consumption in Central & Eastern Europe

### 2. Technical Textiles - Application fields 1/14

<table>
<thead>
<tr>
<th>Application</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrotech</td>
<td>Textiles for agriculture, horticulture, forestry and fishing</td>
</tr>
<tr>
<td>Buildtech</td>
<td>Textile reinforcement, light-weight materials, textile roofing, membranes</td>
</tr>
<tr>
<td>Clothtech</td>
<td>Components for the clothing and footwear industry</td>
</tr>
<tr>
<td>Geotech</td>
<td>Soil sealing, drainage, textiles for civil and hydraulic engineering</td>
</tr>
<tr>
<td>Hometech</td>
<td>Components for furniture, interior textiles and floor covering</td>
</tr>
<tr>
<td>Indutech</td>
<td>Filtration, textile reinforcement, sound insulation, means of conveyance</td>
</tr>
</tbody>
</table>

### 2. Technical Textiles - Application fields 2/14

<table>
<thead>
<tr>
<th>Application</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medtech</td>
<td>Medical and hygienic textiles, textiles for medical devices</td>
</tr>
<tr>
<td>Mobiltech</td>
<td>Textiles for transportation (automotive, aerospace, shipbuilding and railway vehicle industries)</td>
</tr>
<tr>
<td>Oekotech</td>
<td>Textiles for environmental protection</td>
</tr>
<tr>
<td>Protech</td>
<td>Textiles for personal and property protection (workwear, fire protection..)</td>
</tr>
<tr>
<td>Packtech</td>
<td>Industrial and consumer packaging</td>
</tr>
<tr>
<td>Sporttech</td>
<td>Textiles for sporting and leisure applications, textile-reinforced sporting equipment</td>
</tr>
</tbody>
</table>
2. Technical Textiles - Application fields  3/14

Production Technologies

Weaving
Knitting
  warp knitting
  weft knitting
  stitch bonding
Nonwovens
Laid scrims
Braiding
Rope-making etc.

2. Technical Textiles - Application fields  4/14

Raw Material

Use of classic fibres:
  Natural and synthetic fibres
Use of special fibres:
  Hollow fibres
  Highly oriented polymer fibres
  Carbon fibres, metal fibres
  Basalt fibres
  Ceramic fibres, glass fibres
2.1 Industrial textiles - Indutech

- Textile filter tube
- Insulation material
- Conveyor belts
- Textile reinforced parts, backing material, tubes, hoses, sealings

2.2 Mobile textiles – Mobiltech

- Land - Air - Water:
  - Road vehicles, rail vehicles
  - Aircrafts, space travel
  - Shipbuilding
- Safety systems, airbags, tires, car elements, upholstery, car interior, carpets, heat insulation, sound insulation, filters, cable insulation, tarpaulins, protective covers for land crafts, boats, aircrafts, sailcloth, inflatable boats, special equipment for military vehicles, envelopes of balloons etc.
2.2 Mobile textiles – Mobiltech

Innovative trend in aeronautics – use of fibre reinforced synthetics

Percentage of carbon fiber-reinforced polymer (CFRP)
Near future: A380: 20-25%, Boeing 747 ca. 50%

Advantages:
- high tenacity
- stiffness
- dynamic strength
- corrosion resistance
- low density & weight

But: high costs for R&D, testing and certification

2.3 Functional textiles

Protective clothing – Protech

- Warning clothing
- Protective clothing for firefighters
- Protective clothing for welders
- Protective gloves

Sports textiles - Sporttech

- Protective clothing for racing drivers
- Functional protective clothing

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2.3 Functional textiles

Medical textiles - Medtech

dressing material, textile goods for hospitals, textile material in protheses, orthoses textiles for surgery, rescue services etc.

2.4 Packaging textiles - Packtech

packaging material and nets, sacks and big bags, protective cover systems, tarpaulins
2.5 Agrotextiles - Agrotech

soil covering material horticulture + agriculture, textile drainage systems, textile irrigation systems, woven fabrics + knitted fabrics for providing shade, greenhouse equipment, sealing sheets, tarpaulins (Agrotextiles), temporary agricultural buildings

Nets for root balls  Mats for animals  Shading textiles

2.6 Geotextiles - Geotech

GREAT VARIETY OF APPLICATIONS

reservoirs, dams  liquid waste  solid waste  canals

roads  railways  foundations, retaining walls  erosion-control systems
tunnel construction  drainage systems
2.6 Geotextiles – Geotech/Oekotech 13/14

subsoil reinforcement, landscaping, earthmoving and road building, river-bank + coast reinforcement, water engineering, soil sealing, drainage systems

Steep geotextile-reinforced embankment

Protection and greenening of embankments

Geosynthetics in road building

2.7 Textiles for building – Buildtech 14/14

textile reinforcement, lightweight construction materials, pipes, insulations (cold, heat, sound), textile roofings, textile membranes loadbearing structures, sunscreen Textiles, textile heating systems, textile-reinforced structural components, mouldings, tents

Textile membrane

Textile drainage

Textile roof-greening
3. R&D in technical textiles at STFI

<table>
<thead>
<tr>
<th>Application fields</th>
<th>Number of companies in Saxony</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrotech</td>
<td>10</td>
</tr>
<tr>
<td>Buildtech</td>
<td>16</td>
</tr>
<tr>
<td>Geotech</td>
<td>11</td>
</tr>
<tr>
<td>Hometech</td>
<td>43</td>
</tr>
<tr>
<td>Indutech</td>
<td>33</td>
</tr>
<tr>
<td>Medtech</td>
<td>22</td>
</tr>
<tr>
<td>Mobiltech</td>
<td>40</td>
</tr>
<tr>
<td>Oekotech</td>
<td>8</td>
</tr>
<tr>
<td>Packtech</td>
<td>17</td>
</tr>
<tr>
<td>Protech</td>
<td>32</td>
</tr>
<tr>
<td>Sporttech</td>
<td>12</td>
</tr>
</tbody>
</table>

In total: about 190 companies

Industrial textiles: Filter media

- Pile fibre stitch-bonded nonwoven Hycoknit®
  - regeneration of filter elements is possible
  - special finishes (for instance hydrophobic) can be added during production process

- Pocket air filter
- Nonwoven scrim composite Hycofil®
  - for applications up to 250°C
  - high separating and cleaning performance
3. R&D in technical textiles at STFI

**Industrial textiles:**
Leight weight conveyor belt with inserted rods or pools

- application in food industry, textile industry or paper industry
- low tension to tight the belt is required
- no sliding of belts by means of lateral guidance

**Mobile textiles:**
Preforms from carbon filaments

application in automotive and aircraft industry
3. R&D in technical textiles at STFI

Protective textiles: Fabric against liquid metal splashes

- material repels liquid splashes of aluminium and magnesium up to at least 100 g
- low mass per unit area (below 400 g/m²)
- good wear behaviour

Modified Test rig
DIN EN 373

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3. R&D in technical textiles at STFI

Protective textiles:
Explosion-proof textile transport container

Lightweight textile transport container with multifunctional properties:
- protection against fragments from explosion (fragments are absorbed and the energy is accommodated in the textile structure)
- defined pressure reduction
- act as flame barrier
- resistance against high temperatures

www.fly-bag.net

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**Protective textiles:**
Chemical and flame resistant protective gloves

Composite from chemical resistant barrier layers by coating with polymers and laminating with hot melt adhesive foils

Gloves for firefighters

**Agrotextiles:**
Flexible heating and cooling system for horticulture

Solar heating for green houses and winter gardens
3. R&D in technical textiles at STFI

**Agrotexiles:** Biologically degradable spunbonds
- for crop earliness
- protection against weed

**Geotexiles/Building textiles:** Greening of railway tracks by means of a moveable textile plant bedding system
- protection of the gravel bed
- noise reduction
- storage of water
Thank you for attention!

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