Fibers & Applications Committee

Sept 8, 2013, 16:45 – 18:00 hrs.
Room “Seestudio” Festival House
Bregenz / Austria

Minutes

Participants

Austria
Wolfram DAUBEK-PUZA (Lenzing AG)
Dieter EICHINGER (Lenzing AG)

Brazil
Fernando Valente PIMENTEL (ABIT)
Alfredo Emilio BONDUKI (Sinditêxtil)
Josué Christiano GOMES DA SILVA (Coteminas S.A)
Aguinaldo DINIZ FILHO (ABIT)

Chinese Taipei
Douglas T. HSU (Far Eastern Group)

France
Christophe LAMBERT (TDV Industries)
Benoît HACOT (F.F.I.L.C.)

France
Hubert DU POTET (F.F.I.L.C.)

Germany
Thomas GRIES (Institut für Textiltechnik)
Fritz A. GROBIEN (Albrecht, Müller-Pearse)

Netherlands
Loek de VRIES (Ten Cate)

India
Ajay SARDANA (Birla Cellulose-Pulp & Fibre Business)
Suresh A. KOTAK (Kotak & Co. Ginning & Pressing Industries)
Abhimanyu THackersey (Hindoostan)

Indonesia
TRS Raja RAJAGURU (PT Texcoms)

Press
Mario CORTOPASSI (MJ&C Textilia)

Singapore
Stephen GRAY (Huntsman (Singapore) Pte. Ltd.)
Isabelle RENAULT (Huntsman (Singapore) Pte. Ltd.)

South Africa
Walter SIMEONI (WS International Business Facilitation Services CC)

Switzerland
Cornelia BUCHWALDER (Swissmem)

Chair:
Christian P. SCHINDLER (ITMF)
1. Opening Remarks
The Director General opened the meeting with a few introductory remarks. He thanked the participants for their interest in this relatively new Committee.

2. Report from the Seminar on Functional Textiles in June 2013 in Frankfurt
A short summary about the seminar on “Functional Textiles” that took place on June 10, 2013 in Frankfurt/Germany prior to “Techtextil 2013” was given by the Director General. The various presentations of this seminar are available on the “ITMF Members Area” on the ITMF website (www.itmf.org). The meeting welcomed that such a seminar was organised and supports the organisation of similar events in the future.

3. Report from the Visit of Adidas Headquarters in June 2013
A short summary about the visit of the Adidas Headquarters which took place after the end of “Techtextil 2013” on June 14, 2013 was given by the Director General. He emphasized that it was a unique opportunity to learn more about the process of how a leading brand like Adidas is developing and producing new products from the first idea to the final product. It was especially interesting to see that brands are teaming up with many different partners from an array of companies and institutions to develop new ideas and products. The possibility to visit their lab and to talk directly to the Engineering Director provided a unique opportunity to better understand how brands like Adidas function and work. The meeting welcomed such visits that are providing opportunities to have first-hand contact with and insight into companies/organisations from partners along the entire textile supply chain from fibre to retail.

Mr. Loek de Vries, CEO, Royal Ten Cate, Netherlands, gave a very interesting presentation on the opportunities of fibres (see attached document no. 1).

5. Presentation: “Chemical Fibres and Technical Textiles – Opportunities for a Healthy Future"
Prof. Thomas Gries, Institut für Textiltechnik, RWTH Aachen University/Germany gave a very interesting presentation on the various possibilities of using chemical fibers in medical applications (see attached document no. 2).

6. Future Structure
The meeting discussed the future structure of the Committee. As the first Chairman of the Committee Mr. Loek de Vries, President and CEO, Royal TenCate (Netherlands), was nominated. Mr. de Vries was elected unanimously and accepted the election. As Vice Chairman of the Committee Mr. Abhimanyu Thackersey, Executive Director, Hindoostan Mills (India) was nominated. Mr. Thackersey was elected unanimously and accepted the election.

7. Next Meeting
The next regular meeting of the Committee will be held in Beijing in connection with the ITMF Annual Conference 2014 (October 16-18).
8. **Article in “Technical Textiles”**

Attached (document no. 3) you also find for your information the article “Technical Textiles 2012/2103” published in “Technical Textiles (4/2013)” written by Ms. Michaela Uppenkamp from the German Trade Association on Finishing, Yarns, Fabrics and Technical Textiles [Industrieverband Veredelung – Garne – Gewebe – Technische Textilien e.V. (IVGT)].

December 2013
The future of fibres
ITMF meeting

Ir. L. de Vries, President and CEO Royal TenCate
Bregenz, Austria, Sunday, 8 September 2013

Agenda
The future of fibres

1. Fibre property matrix
2. Examples
3. From fibres to business
4. From raw materials to high tech fibres
5. Natural fibres
6. Man-made fibres
7. System fibres
8. Smart production and manufacturing
9. Annex
Fibre property matrix
Changing the performances and functionalities of natural and man-made fibres

<table>
<thead>
<tr>
<th>Performances</th>
<th>Natural fibres</th>
<th>Man-made fibres</th>
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<tr>
<td>Natural fibre properties</td>
<td>Modified or adjusted inherent fibre properties</td>
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<td>Modified or adjusted non-inherent fibre properties</td>
<td>Fibre based material properties</td>
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<td>System fibre properties</td>
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Textile technologies
- Spinning
- Weaving
- Extruding
- Rapping
- Etcetera

Non-textile technologies
- Bleaching
- Pre-treatment
- Finishing
- Resin
- Digital inkjet
- Induction
- Nano

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From fibres to business
Creating the future of fibres

<table>
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<th>Fibres</th>
<th>Products</th>
<th>Markets</th>
<th>Businesses</th>
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From raw materials to high tech fibres
Creating the future of fibres through technological innovation

0: Raw Materials
1: Natural fibres
2: Man-made fibres
3: Modified natural fibres
4: System fibres
5: Textile and non-textile sustaining techniques and disruptive technologies
1: Natural fibres in low tech applications
With simple textile production techniques natural resources can be processed into products with one or a few functionalities.

0: Raw Materials
1: Natural fibres

2A: Man-made fibres in low tech applications
Basic textile technologies using man-made fibres can add basic functionalities: weight reduction or tear strength.

0: Raw Materials
1: Natural fibres
2: Man-made fibres
2B: Man-made fibres in high tech applications
Man-made fibres using high tech textile technologies can add advanced functionalities: fire resistant or ball performance.

0: Raw Materials
1: Natural fibres
2: Man-made fibres

3: Modified natural fibres in high tech applications
Man-made fibres in combination with non-textile technology add more complex functionalities: UV-protective or flame resistant.

0: Raw Materials
1: Natural fibres
2: Man-made fibres
3: Modified natural fibres
4A: Man-made fibre based materials in high tech applications

With more complex non-textile technologies, man-made fibres can be processed into high tech materials and systems.

0: Raw Materials
1: Natural fibres
2: Man-made fibres
3: Modified natural fibres
4: System fibres

4B: Man-made system fibres for high(er) tech applications

High(er) tech non-textile techniques can integrate new functionalities into the fibre and create a system in itself.

0: Raw Materials
1: Natural fibres
2: Man-made fibres
3: Modified natural fibres
4: System fibres

System fibres retaining water by collecting water from the air
System fibres being photovoltaic by converting solar radiation into electricity
4B: Man-made system fibres for high(er) tech applications

High(er) tech non-textile techniques can integrate new functionalities into the fibre and create a system in itself.

0: Raw Materials
1: Natural fibres
2: Man-made fibres
3: Modified natural fibres
4: System fibres

- System fibres to transport data
- System fibres with membrane function to clean water
- System fibres fully integrated to harvest energy
- System fibres fully integrated for medical applications
Smart production and manufacturing
Towards the Factory of the Future

0: Raw Materials
1: Natural fibres
2: Man-made fibres
3: Modified natural fibres
4: System fibres

Sustaining techniques
- synthetic turf carpet
- 3D weaving

Disruptive technologies
- digital inkjet printing and finishing

5: Textile and non-textile sustaining techniques and disruptive technologies

Towards the Factory of the Future
Value chain management by TenCate
TenCate business model
Value chain management and market focus

Mass customization
On demand delivery
Customized product portfolio

TenCate innovation model
Innovation management

New applications
- SPEC INNOVATION
- EXTERNAL
- PRODUCT INNOVATION

New functionalities
- TECHNOLOGY INNOVATION
- INTERNAL
- PROCESS INNOVATION

New ‘business as usual’
New production techniques
**Sustaining technique**
Introduction of the first synthetic tuft carpet 3D weaving machine

**Disruptive technology: towards the Factory of the Future**
Introduction of the first industrial production machine for digital printing and finishing using inkjet
Introducing innovative outdoor fabrics to the market

TenCate business model regarding value chain management

To introduce innovative outdoor fabrics to the market, TenCate emphasizes its business model focused on value chain management. This model aims to meet end-user demands, such as flexibility, reduced customer stock costs, and more customization. TenCate highlights its commitment to innovation, using digital technology and internal process management to enhance efficiency and sustainability.

Towards the Factory of the Future

TenCate Outdoor Fabrics regarding awnings

The future of fibres

TenCate's vision extends to creating a "Factory of the Future," where awnings and related products are developed with a focus on sustainability, innovation, and efficiency. This approach underscores TenCate's dedication to advancing fibres through technological advancements and environmental stewardship.

The future of fibres

[Image of a beach scene with umbrellas and chairs, symbolizing the leisure industry and outdoor fabrics.]
Protecting people
Chemical Fibres and Technical Textiles – Opportunities for a Healthy Future

Thomas Gries,
Gunnar Seide, Christoph Monfeld

ITMF Annual Conference,
Bregenz, September 2013
Health care sector

Health expenditure at about 260 billion euros in Germany

- about 11% of GDP,
- 4.9 Mio. Employees (roughly one in nine);
- => bigger than automotive
- still increasing
- Market is strong regulated
- Many revisions and reforms

Definition quite tolerant; here e.g.:

- core area ambulatory and stationary treatment, work with the elderly, health administration
- supplier and input area: pharmaceutical and medtec industry, health trading
- marginal area: Fitness- und wellness area, assisted living or health tourism

Gross value of the health care sector and percentage of overall economy

[Statistisches Bundesamt 2011, BMWi, 2012]
### The market

**Biomedical engineering (D)**

- Size of the market ~21 B €/a
- Worldwide market share 15%
- Foreign sales ~14.5 B €/a
- Large proportion of SMEs
- >70,000 employees (growing)
- 30% of turnover with products less than 3 years old
- 10% RTD of total budget

![Graph showing the market growth from 2006 to 2011](image)

- Total: ~21 B €/a (2011)
- Overseas: ~14.46 B €/a (2011)
- Inland: ~6.74 B €/a (2011)

Export quota ~ 65%
Textiles and health care

Implants & Tissue Engineering
- Connective tissue
- Cardiovascular
- Orthopedics

Medical textiles
- Active wound care
- Hospital textiles

Hygiene
- Health/Well-being
- Commodities
- Disposables

Health Monitoring
- Risk patients
- Sports
- Workplace
Textiles and health care

- **Hygiene**
  - Source: TITV-Greiz

- **Bandages and compresses**

- **Filtration**
  - Source: Fresenius

- **Telemedicine/ Monitoring**
  - Source: Vivometric

- **Hospital textiles**
  - Source: TITV-Greiz

- **Implants**
  - Source: Ethicon

- **Wound dressing**
  - Source: Hartmann

Source: RWTH Aachen University
Medical Needs for smart textiles

Challenge of ageing population
- mismatch of elderly people with regard to
- medical staff (nurses, doctors, physiotherapists…)
- hospital beds
- nursing home beds
- working population (funding of the health systems)

Smart textiles
- highly integrated
- in normal environment
- supporting patients to
  - stay longer at home
  - increase mobility
  - support medical staff
Smart textiles: assistance, monitoring, protection

Support of Daily Life / Home Care
- remote control
- mobile phone
- orientation
  - at home
  - on the road

Disease Control
- ECG
- respiratory function
- diabetes (Glucose)
- (de-)hydration Status

Disease Control
- at work
- at home

Sources: www.fairmed.at

Source: ITA

Source: future shape
Smart textiles: future trends and developments

Smart materials / fibres
- drug-release fibres
- highly conductive fibers for Monitoring

Production technologies for Smart
- cost efficient
- mass production (e.g. pick-and-place)
- printing and coating technologies

Man-Maschine Interaction
- user friendly
- user oriented
Implants: applications and challenges for medical textiles

Applications
- surgery
  - suture materials, hernia meshes
- cardio-vascular implants
  - stents, vascular grafts, heart valve
- orthopedic implants
  - ligaments
- tissue engineering
  - scaffolds

Challenges
- personalization
- (bio-)materials
- functionalization
- biological function
Trends for implants

Tissue Engineering and Textile Implants

- combination of
  - textile reinforcement
  - biofunctionalization
  - directed load distribution
  - reduction of production time

(Bio)materials / fibre innovations

- pH optimized degrading fibers
- biobased Materials

Extracorporeal medical devices: e.g. wound dressing and bandages

Wound dressing made of innovative biomaterials

- chronic wounds cause expenses of more than 20 bn. €/a in Germany
- passive therapies are unable to support the deranged cascade of wound healing

Bandages with sensors and actuators

- to control flexibility
- muscle stimulation
- compression therapy
Future trends for extracoporal devices

Wound Dressing

- Wound dressing made of e.g. transgene silkworm silk
- wound management with control of moisture, temperature

Bandage

- Control and adjustment of pressure for compression therapy
- Drug Delivery bandage with controlled drug release

Source: ITA

3-dimensional pressure measurement with Smart Socks and pressure mapping measurement with Alphamat [Alpha-Fit]
Disposables: e.g. diapers and incontinence products

Material and recycling aspects
- use of biomaterials -> compostable diapers
- improvements in the structure of diapers for better recycling
  - monomaterial
  - separators

Comfort
- improvements of absorbency
- smell removing
- drug release

Functionalization / Monitoring
- control of moisture
- detecting changes in urine as prevention
Aachen Maastricht Institute of Biobased Materials

I. Molecular & Applied Biotechnology
II. Chemical Processing & Molecular Upgrading
III. Materials Engineering & Soft Matter Technology
IV. Up-scaling & Technical Applications

Technical Applications

Medical Applications

Innovative polymers for…
… innovative applications

30 km
Aachen Maastricht Institute of Biobased Materials

AMI-Biobased Materials

Innovative Polymers

Textile Engineering

(Bio)Function

Pre-clinical Testing

Clinical Trial & Certification

Medical Products

Large Industries
(e.g. DSM, Bayer)

AMI (EuRegio)

SME (EuRegio)

AZM / UKA

Large industries
Conclusion

Health care sector is a relevant, innovative and growing market

Chances with demographic change:
Improving quality of life - from cost driver to growth engine

Innovative (bio)materials will enable innovative health care products

Aachen is the location for research within the health care sector in Europe!
Thank you very much for your attention

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Technical textiles for the construction, automotive or aircraft industries have become the sales force of the German textile industry, where they account for almost 50% of the total turnover. In Europe, this is about 30%. Technical textiles are also an integral part in the 2 traditional textile sectors – clothing (approx. 20%), and household and home textiles (about 30%). This involves functional fabrics for outdoor and sports clothing, fire-resistant, heat-resistant and electromagnetic shielding, home textiles and personal protective clothing, as well as rugs with embedded sensors, e.g. to detect and report a person falling to the ground.

The collection of statistical data by the Federal Statistical Office, however, records only the typical "technical" areas such as the production of narrow fabrics, impregnated, coated or laminated fabrics together with polymers, tire cord and other treated or coated fabrics for the manufacturing of hoses, conveyor belts or transmission belts. Subsequently the following statistical data captures only a portion of all technical textiles. The sector of nonwovens, together with composite materials, has increased by about 22% over last 10 years, and therefore contributed to the growth of technical textiles.

The economic development of the German textile industry in 2012 was mainly characterized by a slowdown in demand. Sales decreased in 2012 compared to the previous year by 2.5% (domestic -3.1%, foreign -1.8%). The highest decrease in sales by -4.3% was within the Eurozone. The reason for this was the recession-induced decline in demand in the major EU countries. This hit German textile exporters strongly, because they handle more than half of their transactions within the EU. Only sales to the rest of the world increased by 13.3%. Even the 2 industry sectors "Production of technical textiles" and "Manufacture of nonwovens and products made from it", which have both been the engines of growth, had to accept significant losses in sales. The total turnover in the production of technical textiles decreased by 2%, and the revenue from the domestic production by 4.8% in 2012. However, international sales grew by 0.3%. Sales in the Eurozone dropped by 2.2%, while sales increased by 2.4% to other countries. The turnover in the production of nonwoven fabrics fell compared with the same period in 2011 by 4.1% and in the domestic market by 1.7%. Total foreign sales decreased by 5.8%, while sales in the Eurozone decreased by 5.4% and sales with other countries declined by 6.1%.

The previously spoilt sector of technical textiles has, similarly to the entire industry suffered a decline in sales in the first quarter of 2013. With revenues of € 572 million it was 8.8% below the previous quarter. Only turnover with foreign countries remained nearly unchanged compared to the previous quarter at 0.1%, while domestic sales fell by 20.2% to € 219 million. The sector of nonwovens started 2013 (1st quarter) with a total turnover of € 337 million, a decline of 4.6% compared to the first quarter of 2012. Domestic sales fell by 4.6% to € 142 million and foreign sales fell by 4.5% to € 196 million.

With 25% of the total market of technical textiles, the area of Mobitec is the largest area within this sector. The large number of different possible end-uses of textiles in automotive, shipbuilding and aerospace offers a high economic potential for the German textile industry. In addition to the advantages of metal and plastic, textiles have the ability to be flexible and malleable. Their color, pattern and texture can be generated in countless variations, and functionalities can be integrated. The use of textiles - not only in automotive production - will continuously increase, as they are easy to recycle and are also light in weight. After Mobiletech application follow areas like Indutech, Sporttech, Buildtech and Medtech. Other areas of application for technical textiles are environmental protection and energy efficiency. The EU would like to increase the energy efficiency by 2020 by 20%. Products based on textiles can help reduce the energy consumption and enable self-powered products (such as reinforced textile fibers in rotor blades of wind turbines) and therefore reduce CO₂ emissions. All 9 of these applications have a high potential for innovative ideas and applications. Germany has a leading position, due to its high research and development intensity of 16 textile research institutes which are closely linked to industry. However, this leadership position is increasingly under attack, especially from China which is increasingly turning away from the lower price segments and towards more technologically advanced products. There is a noticeable mind change to renewable energy and environmental protection. Also a rising health consciousness of the Chinese population contributes to the growth of technical textiles.

In addition to the focus on quality, the development of innovative products and the cooperation between industry and research institutions, particularly the strengthening and expansion of partnerships and networks in the textile chain are key.

**Fig. 1**
Development of sales in the textile industry 2008-2012

**Fig. 2**
Start in the year 2013 – sales in €, 1,000

Sources: Stat. Bundesamt, VR Branchenreport Nr. 24/2013, Euratex, Deutsche Bank Research