Minutes

1. **Opening Remarks**
   The Chairman, Mr. Loek de Vries, opened the meeting with a few introductory remarks.

2. **Presentation by Mr. Michele Riva from EFI-Reggiani (Italy)**
   Mr. Michele Riva, Sales & Marketing Director of EFI-Reggiani, gave a presentation with the title "*The Green Digital Textile Factory of the Year 3000*". The presentation centered on the topic of more environmentally friendly and green production by making use of new processes, new chemistry and new automation which lead to the reduction of inks, lower pollution, lower energy consumption and lower water consumption. The presentation was followed by a lively discussion.

3. **Presentation by Mr. Pascal Denizart from CETI (France)**
   Mr. Pascal Denizart, Director of the Center of European Textile Intelligence (CETI), gave a presentation with the title "*Eco-Design & Bio-based Fibres*". The presentation explained – looking at wipes – how a consumer product can be designed and produced ecologically starting with the various sources of bio-based fibres and how they can be used and recycled indefinitely either biologically or technically (cradle-to-cradle). The presentation was followed by a lively discussion.

4. **Visit of TenCate/Netherlands**
   Mr. de Vries invited the members of the F&A-Committee as well as all other ITMF members interested to visit their textile complex in the Netherlands in November this year in conjunction with the "9th Aachen-Dresden International Textile Conference" in Aachen/Germany (November 26/27, 2016). It was suggested to visit TenCate on November 25, 2015. The ITMF Secretariat will provide the Committee members and the ITMF membership with more details in October.
5. **Future Activities**

Due to the lack of the time there was no possibility to discuss/propose additional activities in 2016. Therefore, any additional suggestions for activities until the ITMF Annual Conference 2016 are most welcome and should be directed to the ITMF Secretariat.

6. **Next Regular Meeting**

The next regular meeting of the F&A-Committee will be in conjunction with the ITMF Annual Conference 2016 which will be held from November 17-19, 2016 in Jaipur/India.

November 2015
"The Green Digital Textile Factory of Y3K"

Mr. Michele Riva, Sales and Marketing Director
San Francisco, 11 September 2015
About Reggiani

1948
- Conventional Printing (manual)

1960
- Rotary and Flat-Bed Printing Machine (analogical)

2002
- First Digital Printer

2009
- Digital Printing Platform

2010
- Birth of Reggiani Group Solution Provider

2013
- New Technologies Patented

2014
- New Technologies

2015
- Birth of
Mission

Build a GREEN Y3K textile world

a **Green** factory:
   a **Green** global solution
for a **Green** global textile world
Reggiani’s Portfolio

- Digital
- Traditional
- Rotary Machines
- Flat Bed Machines

**Inks – Chemistry - Preparation**

- Printing

**Reggiani’s Machines**

- Washing Line
- Preparation Line
- Dyeing Machines

**ACTIVA**

- Fabric Mercerizing
- Bleaching
- Ammonia

**Concord**

- Chemistry - Preparation

**Jaegli Meccanotessile**

- Yarn Mercerizing
- Indicone
- Ammonia for Yarn Treatment

**Mezzera**

- Fabric Preparation
- Dyeing
- Post Treatment
EFI’s Portfolio

- Cloud Services
- Superwide Format
- Fiery
- MIS
- Web-2-Print
- Wide Format
- Labels
- Ceramics
- Textile
The Factory of the Future

100% GREEN & SUSTAINABLE

NEW TECHNOLOGIES
- NEW processes
- NEW eco-chemistry
- NEW automation

NEW DIGITAL FACTORY
- energy savings
- H2O saving
- reduced inks and color waste
New Solution & Technologies

WHY **EFI** | **REGGIANI** IS DIFFERENT?

NEW SOLUTION & TECHNOLOGIES

1. **NEW PROCESSES**
   - Green processes
   - Ad hoc chemical treatments
   - Ad hoc inks

2. **NEW ECO-CHEMISTRY**
   - < 20% inks waste
   - Water based inks
   - New inks

3. **NEW AUTOMATION**
   - New software for production and organizational process management
New Processes

1. NEW PROCESSES

. Print on wet → REGGIANI MACCHINE

. Continuous steaming HP → MEZZERA

. Ammonia treatment (for fabrics) → MEZZERA

. Ammonia treatment (for yarns) → JAEGGLI

. Indicone (for yarns) → JAEGGLI

. Digital finishing → OSIRIS
2. NEW ECO-CHEMISTRY

. Pigment inks & finishing process (for blend fabric)

. No wash disperse inks (for polyester fabric)

. No steam reactive inks (for cotton fabric)

. Acid inks & double face printing process (for silk fabric)

. Preparation process for automotive

. Preparation process for terry towel
New Automation

3. NEW AUTOMATION

the new software application for the factory of the future

. FIERY SW → EFI

Cloud Services

EFI
REGGIANI
From open systems to integrated solutions
INTEGRATION BETWEEN EFI & REGGIANI

THE Y3K ERA

The best of breed of TECHNOLOGIES meets
The best of breed of the MADE IN ITALY
Come and visit **efi** | REGGIANI booth at ITMA in Milan

Hall 18 Booth A109
Center of European Textile Intelligence

ECO-DESIGN & BIO-BASED FIBERS
An unique location in the North of France & Europe

Inside a true hub dedicated to innovation ....

- Research and development team
- Cluster
- Business incubator
- Professional federations and nurturing structures
- Organization of Textile even

CETI Product Insight

Technological & digital platform

To produce together innovative textile solutions for tomorrow’s uses
CETI is dedicated to research and innovation through 3 kinds of activities:

- **OWN RESEARCH**
  Investigation of innovative concepts while developing knowledge and pluridisciplinarity skills.

- **COLLABORATIVE RESEARCH**
  Contribution to collaborative R&D research programs thanks to its skilled staff and pilot equipment. Funding as partner or sub-contractor.

- **PRIVATE RESEARCH**
  Participation in private R&D programs on customers’ request.
A complete pilot offer to take on TECHNOCLOGICAL CHALLENGES

TO CREATE NEW MATERIALS : COMPOUNDING AND SPINNING
The CETI owns one of the world’s five platforms for tri-component spinning.
- Test spinnability of new polymers,
- Create functionalized filaments
- Create fine filaments and fibres
- Combine polymers in a filament or in fabrics

TO PROTOTYPE TRADITIONAL TEXTILE STRUCTURES
CETI’s spinning, weaving and coating units offer the possibility for industrial prototyping of traditional textile structures.
In 2014, the integration of “3-D printing” skills positioned CETI as a leader for hybrid 3-D textile composites in this growing market for uses such as the sound insulation of car interiors or fashion accessories (3-D lace).

TO CREATE NEW TEXTILE STRUCTURES FOR NONWOVEN
Thanks to the flexible configuration of its “drylaid” and “spunlaid” pilot lines, the CETI has a capacity to produce demonstrators for textile composites that is unique in the world. Over 100 possible combinations.
DESIGNING the parameters of eco-design

The use of BIO-SOURCED MATERIALS

RECYCLABILITY

LIGHTENING UP structures (ultra-thin fibers)

The idea of VIRTUALIZING products and procedures
What’s behind the word: bio-based fibers or bio-sourced fibers

- Natural fibers
- Man made fibers, synthetic fibers, bio-based polymers filaments

Bio-based carbon content: fraction of carbon derived from biomass in a product
(EN 16575 Bio-based products – Vocabulary)

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Carbon Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyethylene</td>
<td>PE</td>
<td>100%</td>
</tr>
<tr>
<td>Polyhydroxyalkanoates</td>
<td>PHA</td>
<td>100%</td>
</tr>
<tr>
<td>Polylactic acid</td>
<td>PLA</td>
<td>100%</td>
</tr>
<tr>
<td>Polyamides</td>
<td>PA</td>
<td>40% to 100%</td>
</tr>
</tbody>
</table>

Glucose

Oil plant

Glucose

Oil plant
The eco-design of a bio-based, biodegradable WIPE using a “design thinking” process.
2 SYSTEMATIC APPROACHES

From cradle to grave
Reduce environmental impact and anticipate health risks

From Cradle to Cradle
Create products that can be indefinitely recycled, either biologically or technically

How to proceed to create new bio-based biodegradable wipes?
OUR SKILLS

Our positioning in your market and thematic expectations

Medical
[Health and medical equipment]

Individuals
[Bio-polymers]
[Connected textiles]

Sport
Transportation
[Composite hybrids]

Industry
[Filtration]

Study of the eco-conceived wipe

Design of innovation
Digital design office
Prototyping on a... Processability - ...

Our knowledge of the Textile industry at your service.
Our conception of your products.

Finished product
Textile structure
Fiber
Filament
Material
**MARKET RESEARCH ON THE WIPES**

**Figure 11: Total Deliveries by End-Uses in 2014 (in square metres)**

<table>
<thead>
<tr>
<th>End-Use</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hygiene</td>
<td>58.0%</td>
</tr>
<tr>
<td>Medical / Surgical Wipes</td>
<td>3.1%</td>
</tr>
<tr>
<td>Wipes for Personal care</td>
<td>10.3%</td>
</tr>
<tr>
<td>Wipes - Others</td>
<td>2.5%</td>
</tr>
<tr>
<td>Garments</td>
<td>0.3%</td>
</tr>
<tr>
<td>Interlinings</td>
<td>0.8%</td>
</tr>
<tr>
<td>Shoe / Leathergoods</td>
<td>0.2%</td>
</tr>
<tr>
<td>Coating substrates</td>
<td>0.7%</td>
</tr>
<tr>
<td>Floor Coverings</td>
<td>0.5%</td>
</tr>
<tr>
<td>Upholstery / Table Linen / Household</td>
<td>4.0%</td>
</tr>
<tr>
<td>Air &amp; Gas Filtration</td>
<td>1.0%</td>
</tr>
<tr>
<td>Liquid filtration</td>
<td>0.7%</td>
</tr>
<tr>
<td>Building / Roofing</td>
<td>3.9%</td>
</tr>
<tr>
<td>Civil Engineering / Underground</td>
<td>2.3%</td>
</tr>
<tr>
<td>Automotive</td>
<td>1.6%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>3.0%</td>
</tr>
<tr>
<td>Electronic Materials</td>
<td>0.3%</td>
</tr>
<tr>
<td>Food &amp; Beverage</td>
<td>4.4%</td>
</tr>
<tr>
<td>Others</td>
<td>2.0%</td>
</tr>
<tr>
<td>Unidentified</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

430 000 T/year/Europe
10 millions de m2

**ANNUAL GROWTH (extract from EDANA)**

- medical/surgical: 13%
- wipes for Personal Care: 11%
- wipes - others: 8%

Copyright: EDANA April 2015
WIPES BENCHMARKING ON THE FRENCH MARKET

Identification of raw materials in of 4 wipes brands: Pampers, Kandoo, Biolane, Bébé Cadum, AUCHAN

Wipe 100% viscose

Wipe 100% PLA

Conclusion: No wipes using 100% PLA are available on the French market actually
Table 11: Type of Fibres used the Production of Nonwovens in 1,000 tonnes

<table>
<thead>
<tr>
<th>In Fibre-based processes</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscose</td>
<td>125.3</td>
<td>135.8</td>
<td>142.8</td>
</tr>
<tr>
<td>Polyester (Virgin)</td>
<td>341.9</td>
<td>337.4</td>
<td>352.9</td>
</tr>
<tr>
<td>Polyester (Recycled)</td>
<td>107.9</td>
<td>132.9</td>
<td>151.3</td>
</tr>
</tbody>
</table>

Figure 16: Polyester staple fibre virgin vs. recycled

BUSINESS MODEL

Viscose 1200 €/Tonnes
PP 1180 €/Tonnes
PLA 1700 €/Tonnes
# RAW MATERIAL SELECTION

<table>
<thead>
<tr>
<th>TYPE</th>
<th>ORIGINE</th>
<th>BIO SOURCED</th>
<th>ENVIRONNEMENTAL IMPACT</th>
<th>BIO DEGRADABLE</th>
<th>COMPOSTABLE/RECYCLABLE</th>
<th>CLEANLINESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>viscose ®</td>
<td>cellulose</td>
<td></td>
<td>polluting manufacturing procedure strong carbon footprint</td>
<td>yes</td>
<td></td>
<td>Soft</td>
</tr>
<tr>
<td>tencel ®</td>
<td>cellulose</td>
<td></td>
<td></td>
<td>yes</td>
<td></td>
<td>soft, resistant, waterproof</td>
</tr>
<tr>
<td>PLA</td>
<td>starch</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td>yes (58°C and humidity)</td>
<td>transparent</td>
</tr>
<tr>
<td>Gaïalène®</td>
<td>starch</td>
<td>yes</td>
<td></td>
<td>no</td>
<td>yes</td>
<td>shock-resistant, soft, easy to dye</td>
</tr>
<tr>
<td>Bioplast GF®</td>
<td>potato starch</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td>yes (less than 180 days)</td>
<td>gas-proof (O2, CO2)</td>
</tr>
<tr>
<td>NatureFlex®</td>
<td>Wood pulp</td>
<td>yes</td>
<td>optimization method for reduction</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>viloft®</td>
<td>Wood pulp</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td></td>
<td>soft, flexible, absorbing</td>
</tr>
<tr>
<td>Green™ Polyethylene</td>
<td>Sugar cane</td>
<td>yes</td>
<td></td>
<td>no</td>
<td>yes</td>
<td>identical to polyethylene</td>
</tr>
<tr>
<td>Flax</td>
<td>Flax</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td>yes</td>
<td>UV filter</td>
</tr>
<tr>
<td>Hemp</td>
<td>hemp</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td>no</td>
<td>anti-bacterial, filters radiation</td>
</tr>
<tr>
<td>Jute</td>
<td>Jute cellulose</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td>no</td>
<td>anti-bacterial, resistant</td>
</tr>
<tr>
<td>Ramie</td>
<td>nettle</td>
<td>yes</td>
<td></td>
<td>no</td>
<td>no</td>
<td>anti-bacterial, resistant</td>
</tr>
<tr>
<td>PHA/PHB/PHBV</td>
<td>bacterial origin (starch and sugar)</td>
<td>yes</td>
<td></td>
<td>yes</td>
<td>yes</td>
<td>rigid polymer, resistant</td>
</tr>
</tbody>
</table>
THE LCA APPROACH

Study of environmental problems at each step of a product’s conception

RAW MATERIAL

• Biosourced
• Biodegradable
• Eco-friendly during manufacturing
• Bio-compatible/Bio friendly, non-toxic for living entities

ANALYSIS OF ENERGY CONSUMPTION

• transformation of raw material into a product
• consolidation of the product or its assembly / finalization
• stocking - shipping

USE

• Durability
• Quality
• Functionality

END-OF-LIFE

• Recyclability
• Biodegradability
• Transformable into energy
Even if the compostable wipe’s LCA is generally satisfying, it can be imagined to rethink its end-of-life so recycling could be another option.

The choice of **PLA** as biodegradable and **compostable** fibers is relevant.
The eco-design of a product consists of a reflective approach revolving around the final user beginning with an idea and identifying the need all the way to prototyping the product.
A way to integrate each important variable of an innovative project:

1/ Describing the context and the role of innovation
2/ Analyzing the key needs and functions anticipated by targeted users
3/ Listing each solution proposed
4/ Defining the players involved
5/ Positioning the offer based on different market segments
6/ Analyzing the pertinence of each offer
FOCUS ON WIPES functionality (uses/needs)

- **FP1**: allows the user to clean his environment
- **FC1**: is pleasant to handle (softness)
- **FC2**: is 
- **FC3**: consumes little energy and water when manufactured and used
- **FC4**: is recyclable / biodegradable
- **FC5**: is healthy and without danger for the user
- **FC6**: has qualitative criteria that validates the product and facilitates its use
- **FC7**: respects environmental and security standards
Consumer Profile

Profil type
• WOMAN
• Aged between 20-45 years old
• Sensitive to environmental issues (72% vs 38% men)
• Run the house
A RELEVANT FEEDBACK ANALYSIS
To combine 2 polymers in a filament or in fabrics

To create new nonwovens structure by by the flexibility of the configuration of its lines "spunlaid" and "drylaid" (more than 100 possible combinations)

To Produce hybrid webs

Web formation and consolidation line

Spunbond, Meltblown, Card, Airlay, calander, cross-lapped, hydro-entanglement, needle-loom, oven,
Prototyped wipes:

- 100% rayon® (Viscose)
- 70/30 rayon® (Viscose)/PP
- 70/30 rayon® (Viscose)/PLA (linked to the processability of the machines)

<table>
<thead>
<tr>
<th>Trial</th>
<th>Composition</th>
<th>Process</th>
<th>g/m²</th>
<th>MD Resistance N/5cm</th>
<th>MD Elongation %</th>
<th>CD Resistance N/5cm</th>
<th>CD Elongation %</th>
<th>Permeability 196 Pa l/m²/s</th>
<th>Thickness 0.5 kPas (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V 100%</td>
<td>1</td>
<td>50</td>
<td>35</td>
<td>42</td>
<td>18</td>
<td>112</td>
<td>3846</td>
<td>1.25</td>
</tr>
<tr>
<td>2</td>
<td>V/PP 70/30</td>
<td>1</td>
<td>48</td>
<td>30</td>
<td>70</td>
<td>13</td>
<td>148</td>
<td>4204</td>
<td>1.05</td>
</tr>
<tr>
<td>3</td>
<td>V/PLA 70/30</td>
<td>1</td>
<td>48</td>
<td>31</td>
<td>45</td>
<td>13</td>
<td>130</td>
<td>4486</td>
<td>1.49</td>
</tr>
<tr>
<td>4</td>
<td>V 100%</td>
<td>2</td>
<td>61</td>
<td>108</td>
<td>15</td>
<td>37</td>
<td>84</td>
<td>2180</td>
<td>0.52</td>
</tr>
<tr>
<td>5</td>
<td>V/PP 70/30</td>
<td>2</td>
<td>65</td>
<td>88</td>
<td>24</td>
<td>36</td>
<td>115</td>
<td>2354</td>
<td>0.65</td>
</tr>
<tr>
<td>6</td>
<td>V/PLA 70/30</td>
<td>2</td>
<td>63</td>
<td>94</td>
<td>23</td>
<td>42</td>
<td>78</td>
<td>2588</td>
<td>0.6</td>
</tr>
</tbody>
</table>

The results show that compositions made of 100% biodegradable materials have characteristics similar, if not better, to those made with petro-chemicals (PP base).

It is thus technically possible to eco-conceive recyclable or biodegradable wipes by composting. The question of price remains a strong argument for a single-use products.

Validated feasibility – appropriate production lines for manufacturing already exist.

A biodegradable, biosourced wipe with a PLA base used.

- Procedure 1: drylaid process
- Procedure 2: drylaid process with 2Xhydro entanglement for web consolidation
OVERVIEW

Structuring the collective thinking

- Emotional choice
- Technological choice
- Economical choice

Placing products on the markets

- Rationalization of thinking
- Context of the market and solutions

Formalizing the strategic process of access to market

- Systemic approach to innovate
- Multidisciplinary approach
- Including feedback
A biodegradable, biosourced wipe with a PLA base

Via LCA

Recyclable or compostable wipe
PLA solution retained

Via Design thinking

Technically feasible
Meets consumer needs
The solution to retain focusing on end-of-life criteria

The choice of PLA clearly meets environmental criteria and satisfies the final user. Its success will only depend on the financial commitment of that group.
Benefits of eco-design initiatives

« Eco Design » added value

External target

- Risk of reputation
- Loyalty
- Legislation

Risk management

Defensive

SALE

- New markets
- Differentiation
- Reputation

TEAM

- Stimulate innovation
- Federate team

COSTS

- Secure supply chain
- Manage costs

internal target

Environmental impacts

Recyclability of PLA closed loop
- Eco Efficiency
- Eco Innovation

The purchase extra cost of raw material (PLA) compared to traditional disposable wipes is reduced by as much as the material is recyclable in a closed loop.

- Using production waste
- If Collection industry, recycling of finished products
Search the best solution: COLLABORATIVE INTELLIGENCE

CETI takes part in making textile innovation a major, sustainable & competitive advantage in the market.

CETI's ambition is to be the essential European player for prototyping textile solutions that meet the needs of today's transforming markets. It fabricates innovations in the textile sector for the clothing-textile industry and, more broadly, for all companies that innovate by using textiles, matériau textile.

In 2015
THE NEW SIGNATURE OF THE EUROPEAN CENTER FOR INNOVATIVE TEXTILES
BLUE PRINT

ECO-DESIGN

The priority axes:

- Designing the parameters of eco-design
- The use of bio-sourced materials
- Lightening up structures
- Recyclability
- The idea of Virtualizing products and procedures

SMART TEXTILE

The priority axes:

- Innovation in electroactive and piezoelectric fibers. To allow textile structures to transform mechanical energy into electrical energy.
- Determination of the optimal structure of a fiber for diagnostic, care, ...
- Durability of the smart textile over time
Thank you

pascal.denizart@ceti.com