



International Conference FTC Project Cluster Support: Innovation and R&D

The latest textile and fashion frontiers: from the concept of industrial district to structured production filiere; new technologies and materials innovative applications.

Ing. Solitario Nesti

Istanbul, 26/05/2006



Summary

- Transformation of productive organisation
- Innovation is the future
- Product functionalities
- Tracing and tracking
- Wastewater treatment and reuse



Globalisation is changing industrial districts

- End of space boundaries
- Global production concept
- Production times tend to zero
- Which reactions to the current crisis: reduction of costs, production volumes shrinkage, energy savings, entering new markets?
- Dominance positions are not possible nowadays: need for a new positioning in the globalised economy



Industrial districts changes

*Phase 1 (now)
From competition to co-operation*

Target: competing with Far Eastern countries

- Great challenge opening new opportunities
- Networking as vital priority, taking advantage of third parties know how and collaboration
- Knowledge and technologies shared among enterprises
- Creation of integrated production value chains

New concept, that in old times could be perceived as anti-economical and not competitive



Tecnotessile

Industrial districts changes

*Phase 2 (tomorrow)
from specialisation to multi-disciplinary*

The “New Renaissance” era

New clusters values:

- Integration between science, technology and creativity
- Multidisciplinary approach
- Style and technology interlace
- New products and new “complete” value chains, going from raw materials to final product
- New technologies as “economic value” activators

DESIGN and FASHION

Are still excellence examples of “Made in Italy” brand

Innovation is the key to re-invent design and fashion



Tecnotessile

Innovation as “economic value” generator

The added value is the combination of different generating **factors**:

Products	Highly dependable from the demand and the market
Processes	Determined by in-house know-how and available means (machines)
Services	Immaterial content linked to a product, now seen as the most important marketing component
Knowledge	Has the fundamental role of introducing innovations and new ideas



Tecnotessile

Innovation in Textile Clothing sector (A)

A) Creativity and design

Need of costs and investments reduction



Utilisation of available technologies

- > From technology push to a market pull approach
- > Specialised machines, shorter production times



Tecnotessile

Innovation in Textile Clothing sector (B)

B) Technologies and knowledge

- Individuation of products that are now still in need of investments in technology
- Permanent collaborations with Universities and R&D centres establishment

From stylistic innovation to new materials/new technologies paradigm innovation



Tecnotessile

Examples



ALEXANDER MCQUEEN

Synthetic ethic blasted with stainless steel

Spring/Summer 1996 collection.

The fabric melts silk fluidity and metal look.



Tecnotessile

Examples



KOJI HAMAI

“Gradation (Type I)”

100% polyamide bi-directional stretch, with a thin titanium layer

The fabric combines transpiration and thermal insulation



Tecnotessile

Examples



KAZU TOKI “Wind, Moon and Flower”

On a hand loom five fabric layers have been realised, utilising five different wefts and an optical fibre, for creating the light effect



Tecnotessile

Textile: perspectives and strategies in Europe

- From commodities to **specialist products**, through technology intensive and flexible processes
- Textile uses extension, as raw or semi-finished material, to **diversified applications and/or sectors** (ex. protection, health, wellness, etc.)
- From mass production to a **customised** one, making also use of innovative solutions in logistic and distribution



Tecnotessile

Technical textiles development areas

- Transports
- Agriculture
- Composites
- Industry
- Civil engineering (Geo-textiles and constructions)
- Sanitary and medical
- Protection
- Sports and leisure
- Functional textile



Tecnotessile

Technologies available for innovation making: irradiation

Non-ionizing technologies

- Plasma
- Laser
- UV
- Infrared
- Microwave
- Radio frequency
- Ultrasound

Ionizing technologies

- Electron beam
- X-ray
- Gamma-ray

- *Surface modifications (EB, Plasma, UV)*
- *Mass modifications (EB, Microwave, Ultrasound, Infrared)*



Tecnotessile

Plasma: is a partially ionised gas

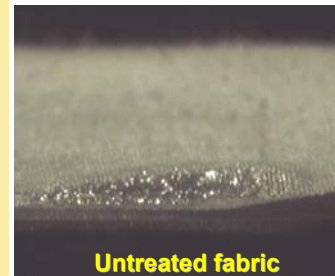
Property	Material	Process gas / Treatment	Plasma effects:
Softness	Cellulosic fibres	Oxygen	-Etching
Anti-felting	Wool	Oxygen, Air	
Crease-resist	Wool, Cotton, Silk	Nitrogen	-Functionalities
Stainless	Polyamide, Polypropylene, PET	Oxygen, Ammonia	
Antistatic	Rayon, Synthetic fibres	Chlorometyl-silanes	-Polymerisation
Wettability	Polyamide, Polypropylene, PET, Polyethylene, PTFE	Oxygen, Air, Ammonia	
Hydrophilicity	PET, Wool	Oxygen, Air	-Sputtering
Hydrophobicity	Cotton, PET	Siloxanes	
Oleo-repellency	Cotton, PET	Fluoropolymers	
Dyeability	Wool, Polyamide	Oxygen, Ammonia, Argon, Ammonia	
Flame retardant	Polyamide, Rayon, Cotton	Phosphorous compounds	
UV shielding	PET, Cotton	HMDSO (hexamethyldisiloxane)	



Tecnotessile

Plasma case study: stain repellency

100% cotton fabric



Untreated fabric



Plasma treated fabric

Oil drop



Tecnotessile

E-beam

- Polymeric materials modifications through direct electron-electron interaction
- Possible e-beam based processes:
 - **Cross-linking** (intra-molecular links creation between polymeric chains);
 - **Degradation** (molecular weight reduction via polymeric chains fragmentation)
 - **Grafting** (monomer polymerisation on a polymeric chain; new functionalities introduction)



Tecnotessile

Microwaves

• Principle:

The magnetic field energy is transformed in thermal energy

• Features:

- Compact heating of the whole material volume
- Dielectric heating (inside temperature higher than surface one)
- Speed and complete absorbance of MW energy by the heated material



Tecnotessile

Nanotechnologies: nano-structured textile products

Smart textiles:

Design of a specific molecular structures allowing to impart to textiles the desired functionalities

Nano-technologies applications are possible during:

- the fibre production phase
- the finishing phase of natural fibres



Tecnotessile

Nano-particles and properties conferred to textiles

	UV Protection	Anti-bacterial and bacteria static effects	Conductibility and magnetical properties
CeO ₂	•		
BaTiO ₃	•	•	
Allumino Silicati	•		
ZnO	•	•	
TiO ₂	•	•	
Ag ⁰		•	•
Ferromagnetiche			•
Au ⁰			•



Tecnotessile

Waste waters treatment technologies

Constraints

- Pure water scarcity
- European law

Pilot technologies developed in Tecnotessile

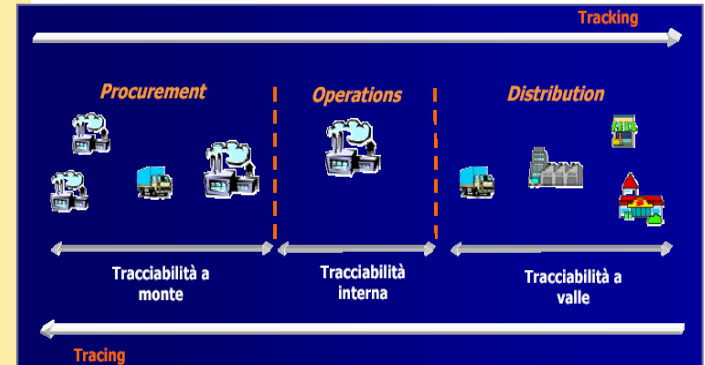
- Membrane filtration (ultra-micro-nano-filtration, reversal osmosis)
- Membrane bio-reactor (MBR)
- Oxidative treatments (like ozonization)

EU projects: Ozowatex, Laferox, Prowater, Amadeus



Tecnotessile

Tracing and tracking



Tecnotessile

Tracing and tracking

Tracking

Is the monitoring of how and where the item is moving along the supply chain, from raw materials first employment to final use of the product.

Tracing

Is the rebuilding of product historical genesis and the individuation of the single lot, from a final or an intermediate phase of the process, going backwards



Tecnotessile

Tracing and tracking

Advantages for the industry:

- ✓ **Safety** (like frauds and robberies control)
- ✓ **Formalities** (clear identification of responsibilities along the value chain)
- ✓ **Quality** (identification and correction of fluctuation causes)
- ✓ **Marketing and brand protection** (origins and history of the product are made clear and undoubted)
- ✓ **Logistic flows optimisation and control**



Tecnotessile

Tracing and tracking

Advantages for the consumer:

- ✓ **Product origin statement**
- ✓ **Compliance with law** (for product composition and product care)
- ✓ **Performance quality assurance** (suitability to use)
- ✓ **Ecologic quality assurance** (absence of harmful substances, both for humans and environments)

Conclusion

Assurance that the economic value of textile product purchased corresponds to the price paid



Tecnotessile

Thank you for your attention!

TECNOTESSILE
via del Gelso 13 – Prato, Italy
tecnotex@tecnotex.it
Tel. +39 0574 634040
www.tecnotex.it