Leather – the Ultimate in Sustainable Materials

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Product Development and Application
LANXESS
Business Unit Leather
Agenda

- General remarks on trends and environmental needs
- How is sustainability defined for leather?
- LANXESS examples for green chemicals?
- Sustainability importance for brands
- Conclusions
Mega trends will positively affect the leather business and a demand for innovative, clean application technologies

3 LANXESS mega trends

<table>
<thead>
<tr>
<th>Urbanisation</th>
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<tr>
<td>Increasing consumption creates fast changing clothing cycles and attitudes</td>
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<td>High demand for natural based materials as contrast to the artificial world</td>
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<td>Less space results in more emphasis on quality interiors and “sexy” materials</td>
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<td>More moving within the city results in higher turn over in furnitures</td>
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<th>Mobility</th>
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<th>Water</th>
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![Graph showing Consumer index per person in US $ vs. City living people in %]
Mega trends will positively affect the leather business and a demand for innovative, clean application technologies

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<td><strong>Urbanisation</strong></td>
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</table>
| **Mobility**            |              | ▪ Increasing number of car owners  
                          |              | ▪ Less power and lower speed creates higher demand on nice interiors  
                          |              | ▪ Light weight / durability important aspects for electro and public transportation  
                          |              | ▪ Luxury segment always wants a differentiation  
| **Water**               |              |          |       |
Mega trends will positively affect the leather business and a demand for innovative, clean application technologies.

3 LANXESS mega trends

**Urbanisation**

**Mobility**

**Water**
- Water becomes the most pressured resource in liquids
- In many areas of our planet it will be more important than oil
- People will compete with animals for water
- Water cleaning technologies and recycling systems are a “must”
Sustainability is a paradigm for any biz strategy for the coming decades

Sustainable economy requires new technologies and priorities

- Balancing the earth’s resources with consumption and population growth is essential for future survival
- Renewable raw materials, recycling options and waste reduction will be key
Climate change programs will pressure OEM’s and initiate a first, predictable technical revolution

NGO’s and financial world independently demand a process of change

Technical Revolution
Modern Leather Manufacturing is not reflected right in medias

The image of the leather industry requires reputation

- info about dirty leather production is omnipresent
- false fact and figures create a wrong perception

Reality is different!

- Leather can be made without undue damage to the environment using best available technologies
The chemical industry has the responsibility to take a lead in the process of change

- Total leather market is highly fragmented and just about 50 billion US$
- Tanneries are small and medium sized companies with limited R&D resources; their focus lies on quality and manufacturing of leather
- Brands will just enforce a technical improvement process
- Chemicals and their applications are a major contributor for sustainability improvements of leather manufacturing
The industry needs to orchestrate joined initiatives to maintain leather as a high valuable article

A lot of things to do …

- We need to agree on standards for genuine leather and best available technologies
- We need to educate the end consumer and the sales people of leather consumer articles → LeatherNaturally!
- We need to do our homework developing new chemicals, improving the manufacturing process, and finding solutions for by-products

![Bar chart showing the global leather market turnover in 1,000 US$]
Sustainable Leather Management is a new business platform to develop and provide future concepts

- Innovation and courage could make the process of change happen
- Our responsibility goes beyond just developing and selling chemicals
- We want to offer holistic technical solutions to the leather industry
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Economical sustainability is an important part of the three principles of responsible care

- The term „eco“ is not clearly defined and widely misused
- … aims to meet human needs (present), while preserving the environment (future)
Other than the term „eco“ the meaning of sustainability is clearly defined.

**Definition of sustainability**

**Sustainability**: aims to meet human needs (present), while preserving the environment (future)

*UN Brundtland Commission (1983)*

**Daly Rules**: physical terms of ethical view

- **renewable resources** must be used no faster than the rate at which they regenerate
- **non-renewable resources** (chrome, fossil fuels) must be used no faster, than renewable substitutes for them can be put into place
- **Pollution and waste** must be emitted no faster than natural systems can absorb them, recycle them or render them harmless

*Prof. of University of Maryland*
All comes down to the human impact, which is measurable; however, there is not the ONE metric for sustainability.

### Sustainability - alternative approaches

<table>
<thead>
<tr>
<th>SDI</th>
<th>Sustainability Development Indicator</th>
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<tr>
<td>HDI</td>
<td>Human Development Index</td>
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<tr>
<td>UNDP</td>
<td>UN Development Program</td>
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<tr>
<td>ESI</td>
<td>Environmental Sustainability Index</td>
</tr>
<tr>
<td>EPI</td>
<td>Environmental Performance Index</td>
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</tbody>
</table>

Different Indies = different views, different approaches and different ideologies in terms of:

- globalisation and urbanisation
- cultural rights to maintain traditions

**IPAT equation:** Human Impact \( I = P \times A \times T \)

\( A = \text{consumption per capita} \quad T = \text{environmental impact per unit of consumption} \)

**EF ecological footprint***:

Dietrich Tegtmeyer

18.5 ton CO2 / a

6.5 ha productive land

*footprintcalculator.com
Hide traceability is an additional sustainability requirement in leather manufacturing

3 main dimensions of environmental aspect of sustainability for leather

- Ecotox profile – toxicity and safety of used chemicals to produce the material
- Product carbon footprint (PCF) – resource requirements of the product over its life cycle
- Renewable raw materials as a base for process chemicals and the origin of used substrates
- Hide traceability – assurance of animal welfare and no further deforestation
There is still a wide spectrum of environmental efficiency in the leather industry in operation

Best available technology (BAT) for leather manufacturing is key

- Best practice standards are established, which ensure a sustainable leather manufacturing
- Metrics are defined in LWG protocol
- Today's BAT-production of 1m² leather requires 10 times less water than the production of a blue jeans?

1 m² leather: ~ 110 l
1m² blue jeans fabric: ~ 1,500 l
Leather production is an integral part of a brilliant recycling concept, which even is based on a sustainable materials

**Holistic view**

- We should broaden our scope and redefine our business scope to the entire collagen business
- As much as possible by-products need to be recycled or used up for durable consumer products or other applications in food and cosmetics
- Remaining process waste need to be insignificant in terms of volume and toxicity
- All raw material exploitations would work together like gear wheels in a clockwork
Leather production provides useful materials for other business needs – 99% could be utilized

### Usage of collagen containing „waste“ of meat industry

- 57% of a dried hide is converted into leather
- Protein, hairs, (~20%) can be used for various products
- Shavings (~5%) can be recycled or reused e.g. for construction materials
- Fat (5%) could be isolated and used as fuel e.g. for steam generation

**Composition of a dried hide without salt**

- 1% salts
- 13% humidity
- 4% fat
- 8% hairs
- 12% protein
- 62% collagen fibre
- 5% shavings
- 6% split
- 4% grain

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* FAO 2004

** JALCA, 105(8), p. 256
The environmental footprint of leather should be determined and benchmarked with substitutes

### LCA Working Group in a start up phase

**Life Cycle Assessment (LCA)** Composite measure of sustainability

- Extracting and processing of raw materials
- Manufacturing, transportation and distribution
- Use, re-use, recycling and final disposal

**Started: LCA Working Group under the lead of LANXESS**

**Facilitator**: Institute for Applied Ecology, Freiburg/Germany

**Funding**: FGL (Research Association Leather/Germany), LANXESS, BASF, Clariant, TFL, S&Z, Schill & Sailacher, Trumpler, Zschimmer & Schwarz, GST, E.O., Pittards, Wollsdorf, Seton, Heller, SLG

**Target**: 1. certified tool to determine a carbon foot prints (CCF and PCF)
2. LCA bench mark of leather vs. alternative substrates
Scientific based eco study could deliver the right facts to improve the image of leather

Steps to develop a Life Cycle Assessment of Leather

1. Software tool to develop the Corporate Carbon Footprint (CCF) → done by FGL
2. Development of a Product Carbon Footprint (PCF) of Leather (incl. chemicals and meat production)
3. Cradle to gate LCA bench mark with alternative materials
4. LCA cradle to grave bench mark incl. consumer product (e.g. shoe) production, use and after use
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A variety of product aspects need to be considered being „green“

<table>
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<tr>
<th>What makes chemicals green?:</th>
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<tbody>
<tr>
<td>▪ Ecotox profile</td>
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<tr>
<td>▪ Safe handling</td>
</tr>
<tr>
<td>▪ Water consumption</td>
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<tr>
<td>▪ Efficiency in use*</td>
</tr>
<tr>
<td>▪ Energy footprint*</td>
</tr>
<tr>
<td>▪ Nature of raw material*</td>
</tr>
<tr>
<td>▪ Biodegradability</td>
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<td>▪ Use / recycleability*</td>
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* These parameters are part of the product carbon footprint (PCF) definition
There are many ways to improve the sustainability profile of leather.

### Important aspects and LANXESS examples for green chemicals:

<table>
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<th>Aspects</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Ecotox profile</td>
<td>formaldehyde-free resin</td>
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<tr>
<td>Safe handling</td>
<td>PREVENTOL U-Tec</td>
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<tr>
<td>Water consumption</td>
<td>NMP-free binder</td>
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<tr>
<td>Efficiency in use*</td>
<td>VOC-free crosslinker</td>
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<td>Energy footprint*</td>
<td>high exhaustion chrome tannage</td>
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<tr>
<td>Nature of raw material*</td>
<td>salt free syntans</td>
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<td>Biodegradability</td>
<td>Top print systems</td>
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<td>Use / recycleability*</td>
<td>X-Grade</td>
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<td>LEVOTAN L polymers</td>
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<td></td>
<td>X-Shield</td>
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<td>mineral oil free raw materials</td>
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<td>light weight leather</td>
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*These parameters are part of the product carbon footprint (PCF) definition.*
SLM is a comprehensive management approach to provide sustainability solutions to the leather industry

3 building blocks of Sustainable Leather Management (SLM)

<table>
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<tr>
<th>Article performance</th>
<th>New chemical systems</th>
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<tbody>
<tr>
<td>Products that enhance the lifetime of the leather final good</td>
<td>COD optimized and salt free retanning systems</td>
</tr>
<tr>
<td>Light weight or low mass leather</td>
<td>zero free formaldehyde and phenol</td>
</tr>
<tr>
<td>development of leather recycling systems or bio degradable leathers.</td>
<td>VOC free finishing systems based on renewable resources.</td>
</tr>
</tbody>
</table>

Process improvements

- eco efficient beamhouse process,
- chrome tanning maximum Cr-exhaustion and zero Cr VI
- development of a sustainable wet white system
- Realize possible recycling option for by-products
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Powerful brands can and do push best available technologies

Leading brands still buy and use significant amounts of leather

- Brands have set restricted substances lists for crucial chemicals
- Brands have established an environmental auditing process for best practice leather manufacturing for their suppliers (Leather Working Group)
- Brands are committed to a hide traceability back to ensure a sustainable origin (Hide Working Group)
- Brands are not ultimately interested in leather, they just need a high performance substrate to work with and want to ensure their environmentally clean philosophy
All 65 Million sqft leather ADIDAS is purchasing a year are selected by LWG rated tanneries

**Brand example ADIDAS**

- Selected leather is considered to be among the sustainable material in use

**Sustainable Materials**

Key sustainable materials in our collections:

- Selected Leathers
- Biobased polymers
- Recycled/Reused Materials
- Tencel
- Organic Cotton
- Better Cotton Initiative
Selected leather is considered to be among the sustainable material in use.

A number of activities are in place to manage an environmental supply chain.

Environmental aspects

Improving our Environmental Footprint

- Restricted substances
- Footwear factories:
  - VOC management
  - Reporting
  - Environmental management systems
- Energy workshops for suppliers since 2007
- Auditing schemes for focus suppliers
- Improvement program and targets for apparel suppliers

Supplier engagement

- Raising environmental awareness and promoting best practices
- Stakeholder meetings with suppliers

Brand example ADIDAS

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Brand example ADIDAS

- Selected leather is considered to be among the sustainable material in use
- A number of activities are in place to manage an environmental supply chain
- All purchased leathers are ranked from a good, better, best - perspective

Best LEATHERS – The most environmentally friendly

Water
• Raw to finished – Max 123.6 liters per square meter (equivalent to 24 points)
• WB to finished - Max 61.8 liters per square meter (equivalent to 24 points)
• Crust to finished - Max 12.4 liters per square meter (equivalent to 24 points)

Energy
• Raw to finished – Max 58.3 MJ/M2 (equivalent to 14 points)
• WB to finished - Max 35.1 MJ/M2 (equivalent to 14 points)
• Crust to finished - Max 25.1 MJ/M2 (equivalent to 14 points)

LWG rating, “end to end Gold”

Maximum weight of finish, 5 grams

Maximum 75 g/m2 (LWG protocol based on EU regulations)
Selected leather is considered to be among the sustainable material in use.

A number of activities are in place to manage an environmental supply chain.

All purchased leathers are ranked from a good, better, best - perspective.

Selected leather articles are allocated to Gold, Silver and Bronze rated tanneries.

Brand example ADIDAS

All 65 Million sqft leather ADIDAS is purchasing a year are selected by LWG rated tanneries.
Leather is part of automotive OEM sustainability strategies

Brand example OEM

- Sustainability panel is reporting to the board

12th Leather Forum 2010.
Flashback R&D leather.
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LANXESS wants to become a leader for sustainability management in the leather industry

What exactly does LANXESS mean with Sustainable Leather Management?

- Our responsibility does go beyond just „selling good chemicals“
- We should interact with brands, associations and NGO‘s to be part in the process of setting guidelines, changing RSL‘s, creating labels, etc. in the interest of the leather producing industry
- We want to offer tanners intelligent chemical and technological solutions for the process of change towards more sustainable manufacturing conditions
- We want to develop tools to help leather producers in marketing their articles as sustainable materials
SLM is a comprehensive management approach to provide sustainability solutions to the leather industry.

3 building blocks of Sustainable Leather Management (SLM):
- Process improvements
- New chemical systems
- Article performance
Leather could be the Ultimate in Sustainable Materials ... if manufactured with best available technologies (BAT)

Sustainability and leather do match up

- The leather making process is the transfer of a renewable resource to a highly valuable and toxicological safe substrate.
- In fact, leather manufacturing is part of a big recycling industry and solves a huge waste problem of the meat industry.
- Leather can be made without sustainable damage of the environment if best available technologies are followed.
- LANXESS wants to become the leader in the industry and a valuable support for our customers.
Sustainable Leather Management will be a paradigm for all of our activities

LANXESS does invest in good science and technology

Corporate activities
- global commitment to legal restrictions
- global guidelines exceeding legal requirements
- sustainability programs
- ISO certifications

Business Unit LEATHER activities

Product stewardship
- REACh compliance
- RSL Management
- lobbying activities (e.g. LWG)
- industry campaigns
- information

Research & development
- compliant to legal restricted substances
- voluntary proactive abandonment of problematic technologies
- focus on development of eco/green process & technologies

LANXESS does invest in good science and technology
Thank you for attention