COMPLIANCE - a business opportunity

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Why is compliance a big issue in leather ?

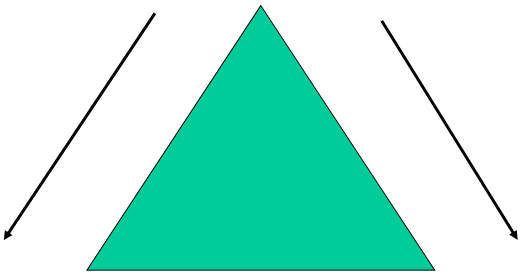
- Process employs a multitude of chemicals , some are hazardous
- Leather manufacturing requires a lot of resources (e.g water)
- Leather manufacturing creates considerable waste loads , some is hazardous
- Tanneries simple ‘stink’

COMPLIANCE

- Compliance with what?
- Who is setting standard ?
- How can we achieve compliance ?
- What are the real obstacles?
- Why to be compliant?

Compliant with what?

Global agreements , e.g. Kyoto Protocol , Greenhouse Gas protocol (GHG),



- **Regulations on emissions, work safety** etc set by local communities or state governments

- **eco- labels, RSL lists, guidelines** set by brands, private institutes, industry organizations, national governments

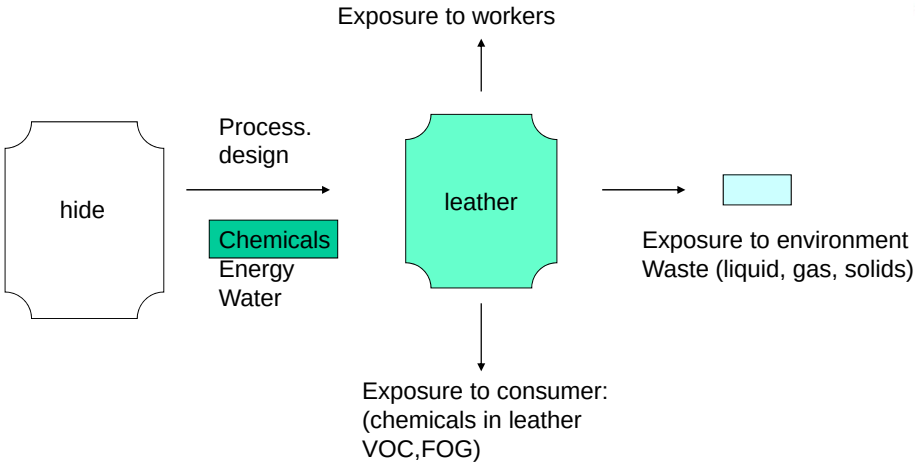
Lost

Due to the complex nature of the leather manufacturing process and leather as a product the tanners can find themselves easily lost by

- the multitude of regulations set by various stakeholders in the supply chain and
- Certain terms being used in public discussion, like sustainability, Life Cycle Analysis etc

Is there a way out of the maze ?

The tanners choice



By choice of resources and process design the tanner decides how leather and the leather manufacturing process is perceived by the consumer and how much it has an impact on environment

Most important regulations

- **RSL Lists of brands & eco labels (TUV-SG, Oekotex 100 etc)**
- **LWG (Leather Working Group backed by Major Brands): auditing protocol on environmental parameters, working standards**
- **REACH; EC- Directives on restricted substances**
- **Proposition 65 (California) restriction /declaration of chemical substances with concern to human contact**
- **Blue Angel (Germany) : restricted substances (biocides etc)**
- **Local community or state regulations on emissions** (water, air, solid waste, working conditions etc.)
- **Global agreements** , e.g. Kyoto Protocol , Greenhouse Gas protocol (GHG),

REACH –what to know for 'non EU' tanners

Background: Any producer /importer of a chemical in EIU need to register it; chemical can be restricted for certain or all uses if it is deemd to be of high concern to human and or the environment

- In case product you are using is made in EU check with your supplier/ importer if he intents to register it and if not plans to continue making the product e.g. outside EU
- Check with your supplier if products you buy contain substances which are SVHC (substances of very high concern) . Those are on the REACH candidate list and could become restricted in future; list is continuously updated and growing
- Although leather basically could contain 0.1% of a SVHC substance brands often take a very proactive step by asking for complete absence: example if formaldehyde would be a SVHC, the limit would be 1000 ppm, brands set it as low as 10 ppm

LWG Leather Working Group

- LWG is a non profit organization comprised of brands, tanners and suppliers of raw materials (e.g. hides /chemicals)
- LWG issues and regularly updates an auditing protocol as base for auditing tanneries with regards to environmental , health safety and working standards
- Auditing covers entire supply and production chain from raw hides to finished leather
- LWG does not have a set RSL list (base is compliance with tanners RSL lists)
- Auditing considers also amount and type of energy used (renewable)
- Auditing results in a gold , silver , bronze medal rating and 'failed'

Restrictions

Restrictions can pertain

- to a single chemical in leather meaning that

1. Presence (Use) of a specific chemical is not allowed (some biocides)
2. Use is basically allowed but presence in final leather or waste is set at certain, most often very low limits (CH_20, certain solvents, etc.)

- Limits of a chemical in wastewater, sludge, air
- To the amount of greenhouse gas emissions
- To the amount of used resources (e.g. water)

Limits are usually set by (eco) toxicological studies or assessment but often artificially go down through competition to be 'greenest' and 'safest'

Restricted substances with relevance to leather (1)

- **Aromatic Amines** from azo dyes (forbidden amines):

1. EU directives sets 30mg/kg /amine; lower values can be false
2. China and a major brands go lower (20mg/kg)
3. Alternatives are available

- **Phtalates** (DINP, DEHP,DNOP ,DIDP,BBP &DBP)

1. present as plasticizer in NC/CAB lacquers
2. restricted in EU: max. 0.1% in preparations
3. Substitutes are available

- **Heavy Metals (As,Cd,Pb,Hg,Sb,Ba, Se, Cr),**

1. limits set by EN 71-3 (toys) by extraction method
2. no problem in leather except for Cr (60 ppm) (problem is low extraction pH of test method)

Restricted substances with relevance to leather (2)

- **Short Chain Chlorinated Paraffins** (SCCP , C10-C13):

1. Can be present in fatliquors
2. regulated by EU Directive 2002/45/EC;
3. alternatives are available

- **Biocides** :

1. DMF, chlorinated phenols (PCP, TECP, TriCP) (restricted by EU directive)
2. OPP (brands, Proposition 65),
3. TCMTB(brands, consumer goods act Germany), Blue Angel (Germany)
4. Max. allowable limits for pCMK, OPP,TCMTB and OIT (Blue Angel Germany, brands
5. Limited alternatives; optimized application for best uptake

- **Boric acid, Borates** :

1. used in deliming products ,neutralizing products etc.
2. SVHC candidate list under REACH ;
3. alternatives available

Restricted Substances with relevance to leather (3)

- **Alkylphenolethoxylates (APEO's)** :

1. EU directives allows 0.1% in preparations;
2. many brands limit APEO at 100pmm in leather
3. alternatives are based on fatty alcohol polyglycolethers and modern enzymatic degreasing technology (BORRON® DL)

- **Formaldehyde** :

1. regulated by brands/eco-labels , not by REACH /EU directives:
2. typical limits shoe : 75mg/kg adults with skin contact, 20mg/kg for babies,
3. automotive leather: typically 10ppm ; acetaldehyde (Japan) even lower
4. Prevention: low /free CH20 syntans , fixing/tanning agents; use of chemical scavengers , veg. tannins , Sellasol ®HFN, PR, MI

Restricted Substances with relevance to leather (4)

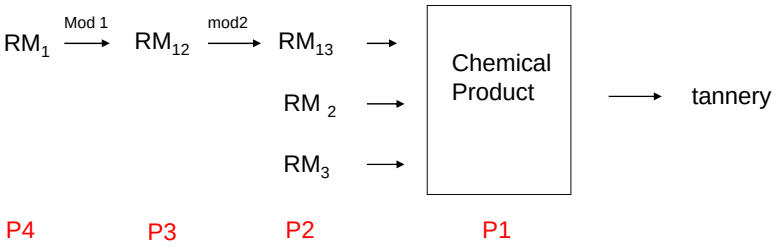
- **Chromium VI**

1. Chromium 6+ became major trouble maker
2. 3ppm by EU directive (detection limit);
3. chrome 6+ formation; unsaturated fats, high pH , low humidity
4. Prevention: process design , use of veg. tannins , antioxidants

- **PFOS** (perfluoro-octanesulfonate): banned by EU directive as it is persistent , alternatives are available
- **NMP(used in PU dispersions)** is not banned as such but due to its classification and low allowable limit (proposition 65, EU directives), it is goingt to be largely substituted ; alternatives are available;
- **Other VOC's** from leather regulated by automotive industry, especially those with hazardous properties (some glycolethers)
- **VOC's:** emitted in leather production : solvent recovering, Roller coating techniques

Other Restricted Substances

- RSL Lists often contain many other restricted substances which do not play any role in leather chemicals
- Tanners have to check with their supplier for absence , often request for complete absence which can not be guaranteed as there is chance of environmental noise detectable with modern analytical methods



➔ It is mandatory that each producer (P) knows about composition of his products and possible impurities or side components

Sustainability, Product Life Cycle ,

Sustainable leather production means

- using maximum amount of raw materials which are renewable and do not harm enironment
- Using a production process which uses minimum amount of (renewable) energies
- Producing emissions which do not harm the environment and humans
- Producing an end product which can be recycled / re-used without harm to environment

In a **Life Cycle Analysis** (LCA) all aspects of a product from birth to death are considered with regards to total environmental impact and use /depeltion of resources

- ‘ LCA of main tannages (chrome, vegetable, aldehyde type) show apparently no major differences ‘

Critical for Sustainability and Environmental Impact

- Chemicals (biodegradability, (eco) toxicity, **renewable?**)
- Wastewater (biodegradation of chemical components)
- Leather and solid waste (biodegradability & toxicity of chemical substances, presence of persistent chemicals)
- Air Emissions (solvents, hydrogen sulfide , other hazardous air pollutants
- Kind and amount of energy used (% fossil energy; running times, process temperature, drying temperature)
- Amount of water (short floats, recycling, drum design)
- Where do raw materials (hides, chemicals etc) come from (distance)

REAL ISSUES

- SULFIDE
- AMMONIA (NH_4)
- SALTS
- CHROME
- BIOCIDES
- ODOR (hides, beamhouse)
- AMOUNT OF RESOURCES

Sulfide

Problem: Very high immediate toxicity to humans and aquatic organism, bad smell

- Until now no complete substiution of sulfide in place which works without sacrificing leather quality
- **'Temporary' solution : Sulfide Reduction and in process elimination :**
- **TFL Maxi Lime® Process** uses special enzyme to reduce sulfide and incorporates 'in process ' sulfide oxidation which starts after completion of hair removal (air , catalyst, float recycling) ; sulfide free pelt for deliming, sulfide free lime float

Ammonia (NH3)

Problem : high oxygen demand, toxic for fish, high contribution to sulfate load

- Full substitution is basically possible but more expensive

Solutions

- CO_2 deliming in combination with little amount of organic acids
- Use of special organic acid based products (Dermascal® F) or organic cyclic esters like **Dermascal CD** ®, very mild and efficient deliming, minimum salt impact , faster pickle and better chrome penetration , fully biodegradable ; more costly

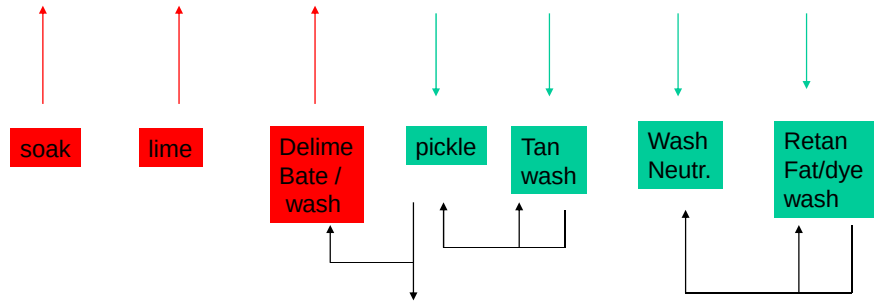
Salts

Problem: high salinity a problem for plant growth and crop yields ; salt removal from effluent quite costly

Solutions

- Removal of preservation salt: a) fresh hide processing (chilling, local processing to a 'stabilized' pelt, EB treatment, Na-silicate (Wasserglas)
- Low salt pickle systems Sellatan® PA technology in combination with chrome /chrome free (pre) -tanning systems), open float recycling (pickle / chrome, re-use of spend retanning floats for washing etc.)
- Low salt chemical products (e.g. syntans, powder products)

A word on float recycling

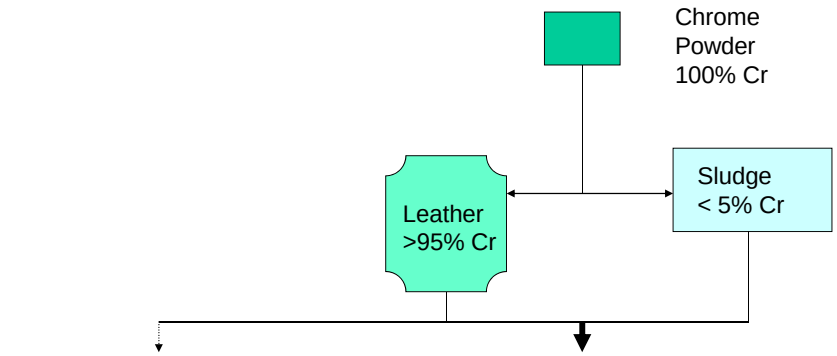


Float recycling can safe water, chemicals& emissions , if

- spent float contains chemicals which are needed and float is not Contaminated with unwanted species
- If proper measures are taken to control consistency of spent float

Chrome Issues

Problem : a) chrome 6+ formation
b) sustainability issue



De- chroming and then Reuse

Landfill: Cr is diluted , **not** Recoverable
Incineration: chrome 6+, Chrome sludge, no re-use

Chrome - solutions

- **Recycling:** re-use chrome by collecting and de-chroming leather products
- **Reduce input/output of chrome &salts**: novel SELLATAN PA® pickling &chrome tanning process (avoids disadvantages of traditional high chrome exhaust tanning) , improves leather quality
- **Chrome free pre-tanning (stabilized pelt)** und subsequent tanning with veg. tannins or Veg/synt. Tannins and/ or optional chrome retanning - challenge: tanning /retanning with minimum resources as to synthetic and natural tannins
- **Efficient prevention of chrome 6+ formation** by selective use of retanning / fatliquoring chemicals and optional use of new patented Sellatan C6® technology in retanning process

Biocides

Problem: Skin irritation , possible impact on biological waste water treatment and on environment(if poorly degradable)

- Chemical biocides always have a certain inherent toxicity and are also not readily biodegradable (goal is preservation)
- Biocides are strictly regulated in many countries (EU-BPD, US: FIFRA etc.) and only limited number of actives are available

Solutions

- **1.** Optimize uptake from floats 2. chose biocides with best balance between efficiency and low toxicity (good fixation and low evaporation and thus low exposure & 'chemical' smell –VOC)
- TFL offer (through partner ship with Thor): Biocides based on OIT with controlled release (encapsulated) and thus reduced exposure to workers during processing (Acticide® WB 909 , WB 910)
- 'Dry white', pickling

Odor

Problem : A tannery produces still produces unpleasant smell resulting from

1. liming (formation of volatile amines),
2. use of sulfides,
3. putrefaction of hides (poor preservation)

Bad Odor creates a negative public image of tanning industry and has to be addressed

Solutions

- Proper preservation and hide storage
- Sulfide (elimination) ; peroxides would completely eliminate smell
- Run exhaust air from hide storage and beamhouse through scrubber units

What makes leather unique?

What makes leather unique?

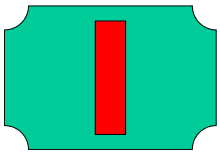
- Leather is a ‘natural product’ which can please your senses (touch, smell)
- Leather has unique surface morphology which allows different ‘finishing ‘ effects
- Leather has unique physical – good phys.mechanical properties making it durable in wear and lasting long (life cycle), good water vapour permation /uptake& release, good thermal insulation (comfort)
- Leather can be a material which is fully biodegradable into components which are not harming the environment but are turned into new organic material (sustainable)

Examples

- **TFL White Line** ®leathers : chrome / chrome free leather made with selected products to comply with major directives (e.g. SG label) –White Line is part of TFL ECOSOLUTIONS
- **TFL MAXI Solutions**® products which largely contribute to best useable area of leather (cutting yield) - this includes TOPCARE ® Finishing upgrading products
- **TFL PROTECT Line®:** products to protect leathers from water, fire and sun (DRYWALK®,TFL COOL®, SCOTCHGUARD™(3M), SELLA ®TEC SAFE)

Leather is a Natural Product

% based on dry weight



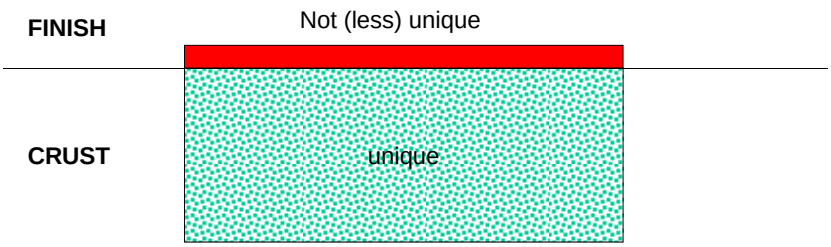
>85% collagen

- **collagen is full renewable** (GHG impact of cattle raising vs GHG of plastics ?)

< 15% tannins, chemicals salts

- Selection of non toxic biodegradable chemicals
- emissions which do not harm environment
- production by using less resources

Uniqueness



The business opportunity

It is the tanners **choice** to decide on a strategy

This could be

- Manufacturing a high quality product with **unique** physical and aesthetical properties (not in competition with synthetic leather)
- Manufacturing a completely **safe** product with **unique** ecological properties in compliance with regulations
- To Be proud of this product and market it in a most professional way
- Stand firm in buying (raw hides) and selling (brands) decisions