



Benchmarking: Part 3

OVERALL MATERIALS BALANCE IN CONVENTIONAL TANNING⁽¹⁾

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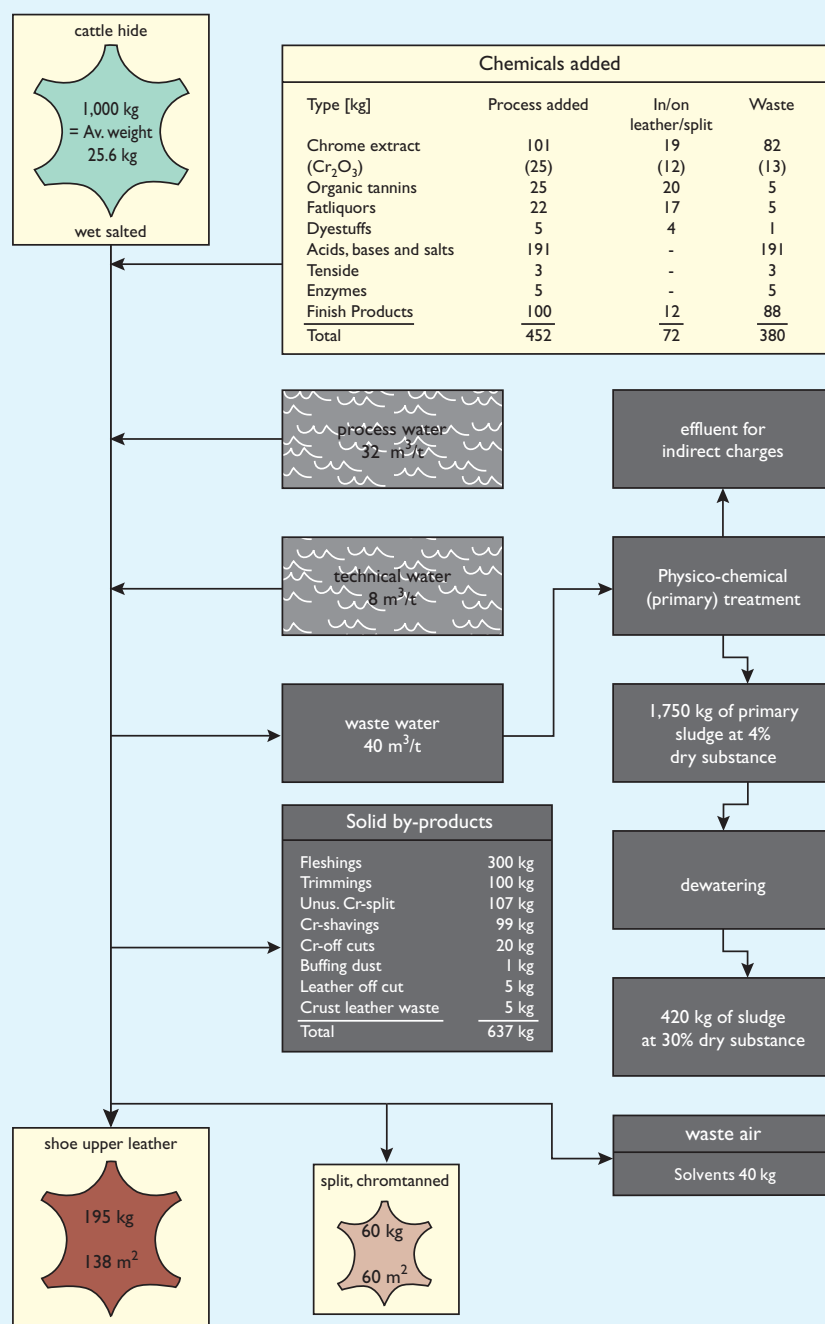
Clean technology and the reuse of valuable raw materials often treated as waste are available options to reduce the prolific waste of resources within leather manufacture. A starting point is needed, and *Panel 1* represents the best available

model as the mass balance in leather manufacture⁽³⁾. It provides the classic benchmark for tanners to base their own calculations in analysing a specific in-house situation⁽⁴⁾.

Despite its relatively low share in the total production cost

Panel 1:

Mass balance in leather processing



OVERALL MATERIALS BALANCE IN CONVENTIONAL TANNING



(typically about 3%), considerable energy savings can be made by careful selection of methods and equipment as well as close control of thermal efficiency.

When a tannery is performing a benchmarking exercise, it is normal to use a questionnaire as a tool for assessment. A typical questionnaire for energy management and energy consumption is given as *Panel 2*.

Definition

Benchmarking: a process by which a business systematically measures itself against a better performing business, and then adopts and adapts any functions or procedures shown to be more effective.

Panel 2:**Evaluation of energy management**

Check List No.		Component: Energy management	
Item		Yes	No
1	All warm water and steam pipes well insulated, no leakages.		
2	Hot-cold water mixing system well calibrated, short adjustment cycles.		
3	Optimised mechanical dewatering (sammying).		
4	If viable, natural drying used (especially for high quality soft leather; skins).		
5	Optimal drying regime in drying chambers and tunnels (e.g. higher air velocity, lower temperature).		
6	Infrared heating used for drying in finishing.		
7	Solar energy supported drying.		
8	Use of heat pumps.		
9	Electromotors' capacity optimised (usually 75% of maximum performance).		
10	Hot water/steam boiler and auxiliary components design and performance allows only lowest technically possible losses.		
11	Wherever viable, waste heat (e.g. from vacuum driers, compressors) recovered.		
12	Steam condensate recovered.		
13	The scale of operations permitting, part of energy needs obtained from anaerobic digestion of fleshings and sludge.		
14	The scale of operations permitting, part of energy needs obtained from incineration from chrome-free solid wastes (fleshings, fat).		
15	Automatic and/or manual controls of heating/cooling/ventilation/lighting systems in place.		

For general guidance the energy consumption of different forms of leather drying is given as *Panel 3*.

Panel 3:**Energy consumption of various drying methods^(5,6)**

Drying method	MJ/kg of water evaporated	
	Without heat pump	With heat pump
(Theoretical minimum)	(2.48)	
Toggling	8.17	
Pasting	6.37	
Chamber drying	5.83	1.62
Vacuum drying	7.20	1.37
Through-feed drying	5.22	1.12
High frequency drying	6.84	

Legend:

- 1) Two papers have been published in *World Leather* setting down various aspects of Benchmarking. *Benchmarking Part 1: a comparison with the best in the sector*, October 2008 and *Benchmarking Part 2: outline guidance of a model tannery*, November 2008.
- 2) This paper is an updated and expanded paper by Jakov Buljan, presented in the XVI Meeting of UNIDO Leather and Leather Products Panel, held in Gramado, R.S, Brazil, 20-23 May 2007.
- 3) Panel 1 has been extracted from a study entitled "Mass balance in leather processing", (J.Buljan, G.Reich, J.Ludvik, UNIDO), published in *World Leather* May 1999.
- 4) The original 10-page paper is available on request from *World Leather*.
- 5) Re: H.P.Ffisterer, *Energieeinsatz in der Lederindustrie, Bibliothek des Leders*, Vol 9 1986. Included within the EC Integrated Pollution Prevention and Control (IPPC) series, *Reference Document on Best Available Techniques for the Tanning of Hides and Skins*, Feb 2003.
- 6) Advances in technical levels/efficiencies since these values were determined need to be taken into account.