

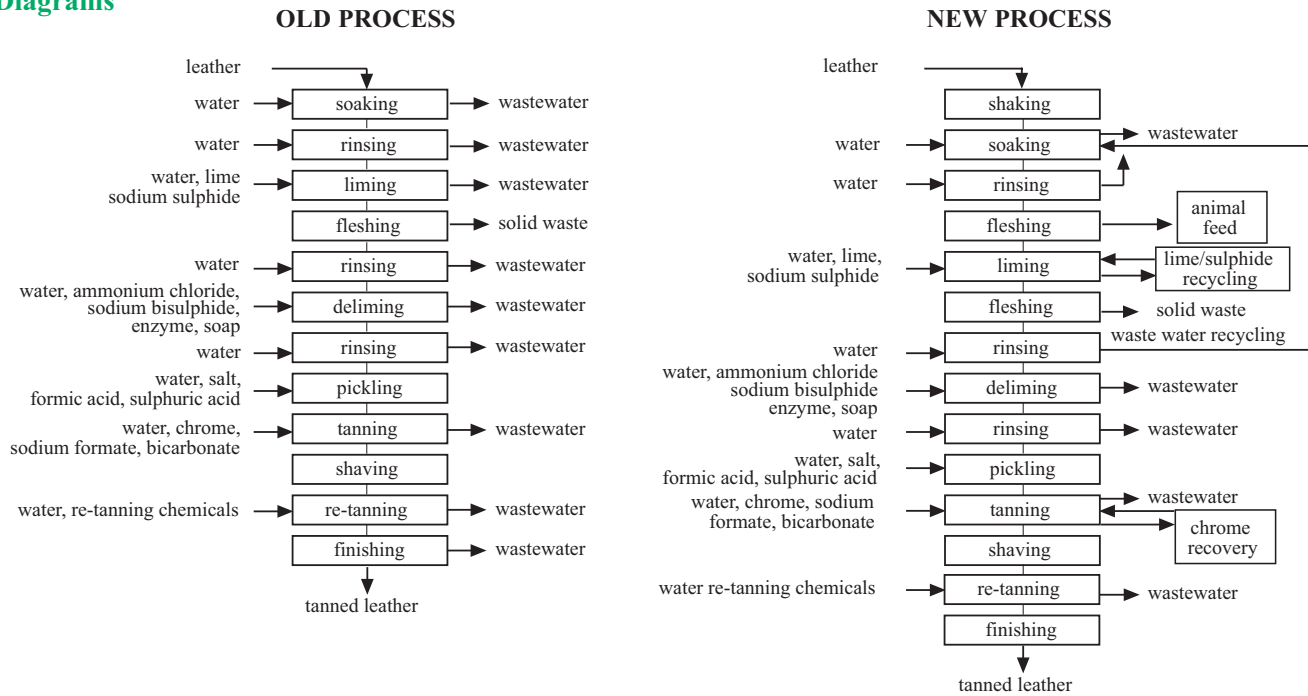
MedClean Propre Limpio


No. 14
Pollution prevention case studies

Introducing cleaner production in the tanning sector

Institution in charge	Unit of Planning and Programming (UPP). Ministry of the Environment (MOE). (Lebanon).
Industrial sector	Tanning industry
Environmental considerations	Tanning activities use contaminating chemical substances, and have adverse impacts in wastewater, land, and air. They also have impacts due to odours and noise from the installations, and health impacts on the workers.
Background	<p>To implement Cleaner Production options (CP) in the tanning sector industry, the MOE decided to conduct an environmental audit on one selected tannery, where CP options were identified. The selected tannery is a typical medium-sized chromium tannery that processes yearly close to 250 tonnes of raw hides and goat skins (80% and 20% respectively). The environmental audit identified several CP options:</p> <ol style="list-style-type: none"> 1. Shaking the salted hides by hand before soaking in order to reduce salinity in the wastewater generated from the soaking process. 2. Re-use of relatively clean rinse and wash waters in other processes where the low concentration of residual chemicals will have little adverse impact. 3. Recycling of lime/sulphide liquors in the liming process if screening is carried out to remove solids and hair. 4. More sophisticated systems of sulphide recycling by stripping sulphide if liquors are acidified, and H₂S gas released and collected in a caustic soda solution prior to subsequent re-use. 5. Correct determination of respective weights of the hides after each process to calculate the exact weight of chemicals needed. 6. Green fleshing after soaking. By means of this procedure, an acceptable fleshing for the production of fats and proteins, or for composting, is achieved. It also improves the penetration level of chemicals. 7. High chrome exhaustion techniques by shorter float, optimum initial temperatures (38°C), increasing tanning time and optimising the alkalinity. 8. Chrome substitution by titanium. Titanium produces salts of generally low toxicity and has a very high uptake. 9. Chrome precipitation and recovery as hydroxide by means of its treatment with alkali.
Summary of actions	<p>After executing the audit, the following actions were held as possible.</p> <ol style="list-style-type: none"> 1. By shaking the salted hides before soaking, a 40% reduction of the salt content of salted hides and reduction of water consumption can be achieved by recycling the rinsing wash for soaking. 2. By recycling lime/sulphide liquors, water consumption reduction and up to 40% savings of sulphide and 50% savings in lime can be achieved. 3. Determining in a correct way the respective weights of the hides after each process prevents an excessive amount of chemicals. 4. By applying green fleshing before the liming stage, an 18% reduction of the hides' weight is achieved. This brings an 18% saving in water and chemicals. 5. By means of high chrome exhaustion techniques, the concentration of chrome remains in the wastewater can be reduced from 4% to 2%. 6. Given that titanium absorption is very high, replacing chrome with it achieves minimum residue concentration in tanning effluents. 7. Chrome precipitation and recovery permits chromium recycling.

Diagrams



Balances

Option	Justification	Benefits	Costs (USD)	Savings (USD/year)	Payback period
1	Reduction by 40% of chlorides in the rinsing bath	- Water savings - Wastewater volume and load reduction	Screening filters: 800 Holding tank: 7,500 Centrifugal pump: 500	28,000	4 months
2	The residual from the wash lime floats acts as an accelerator for soaking operations.	- Reduction of water consumption - Wastewater volume and load reduction	Screening filters: 800 Holding tank: 7,500 Centrifugal pump: 500	5,600	19 months
3	Laboratory tests showed that 94% of initial concentration of sulphides remains in wastewater.	- Reduction of sulphides in wastewater by 51.5% approx. - Reduction in wastewater generation	Screening filters: 2,800 Holding tank: 7,500 Centrifugal pump: 500	44,280	3 months
4	Recovery of effluents	- Reduction of water and sulphide consumption - Reduction in wastewater generation	85,000	44,200	23 months
5	Theoretical input values of raw materials never match the practised values, due to the fact that hides' weight is not measured at every stage.	- Reduction of water and raw materials consumption - Wastewater volume and load reduction	2,000	7,120	3.5 months
6	Reduction to 2% of chrome remains in the wastewater.	- Reduction in chrome concentration in wastewater	No cost	Wastewater treatment costs	
7	Titanium absorption is very high, leading to minimal residues in tanning effluents.	- Elimination of chrome in wastewater	No cost	Wastewater treatment costs	
8	Recycling of chromium from the effluents.	- Reduction of chrome concentration in wastewater - Reduction in chrome consumption	35,000	9,180	46 months
9	Green fleshing reduces sulphide and chlorides presence in the fleshing remains.	- Reduction close to 18% of hides weight and raw materials - Fleshing can be used for other purposes	Every tannery	26,340	

Conclusions

Due to the MOE's initiative, after the carrying out of the environmental audit in one selected tannery, several options to apply generally in this industrial sector in Lebanon were identified. With the implementation of this options aimed at pollutant load reduction, adverse impact of this activity is reduced. Also, savings in water and chemical substances are achieved by promoting re-use and recycling.

NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.



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