



Leather Tanning

(Manufacturing Process)

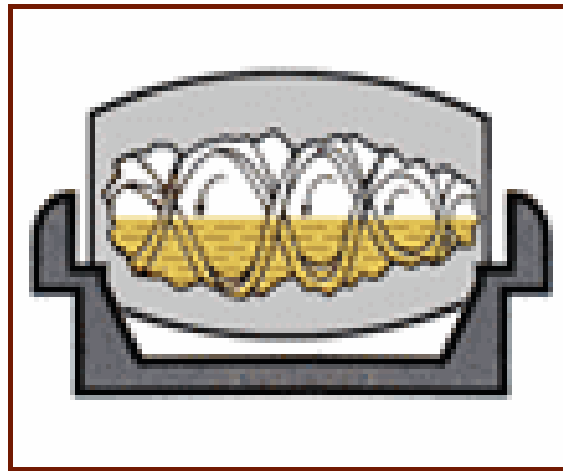
What is tanning?

- Leather is made from animal skins or hides which have been chemically treated to preserve quality and natural beauty. The chemical procedure used to ready raw animal hides for use is called "tanning." A piece of hide or skin which has been tanned produces a strong, flexible leather which is able to resist decay and spoilage.



Step 1: Soaking

- Hides are re-hydrated or re-soaked and washed in large rotating drums



Step 2: Hair Removal

- Hair is removed by chemical digestion
 - Lime and sodium sulphide solution
- Hairless hides are then neutralized with acids and treated with enzymes
 - Removes deposits
 - Increases softness



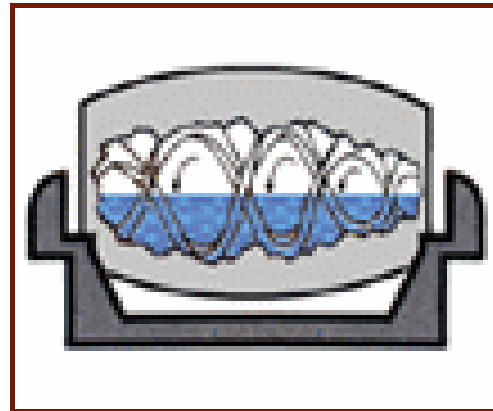
Step 3: Delimiting

- Hairless hides are then neutralized with acids and treated with enzymes
 - Removes deposits
 - Increases softness



Step 4: Pickling

- Hides are soaked in a solution of water, salt, and hydrochloric (or sulphuric) acid



Step 5: Tanning

- Tanning
 - Two main methods: Chrome and Vegetable
 - Chrome is more common
 - Vegetable tanning produces stiffer leathers; chrome tanning produces softer leather



Step 5: Chrome Tanning

- Most upholstery, shoes, garments, bags
- Hides placed in rotating drums and washed in a chemical containing trivalent chrome
- After 8 hours, the chrome is “fixed” with an alkaline chemical (sodium carbonate)



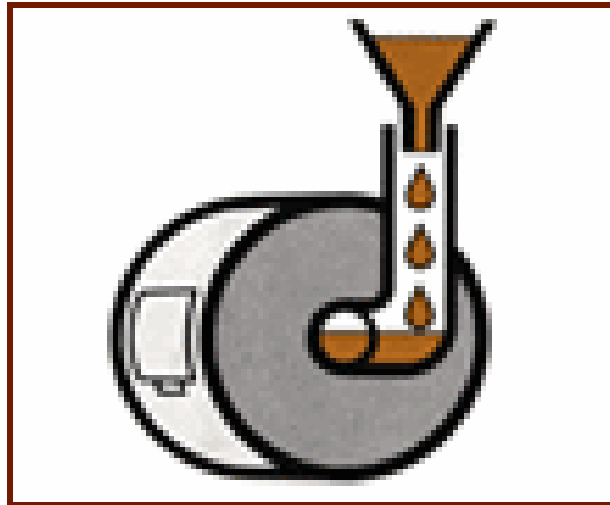
Step 5: Vegetable Tanning

- Used on shoe soles, luggage, belts, and some upholstery
- Slower, 2-4 days
- Uses tannic acid, which is extracted from tree bark



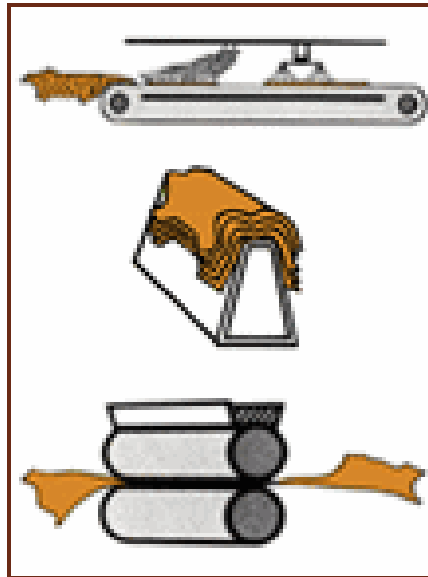
Step 6: Dyeing

- Placed in rotating drums with hot water, dyes, and synthetic tanning materials to obtain desired color



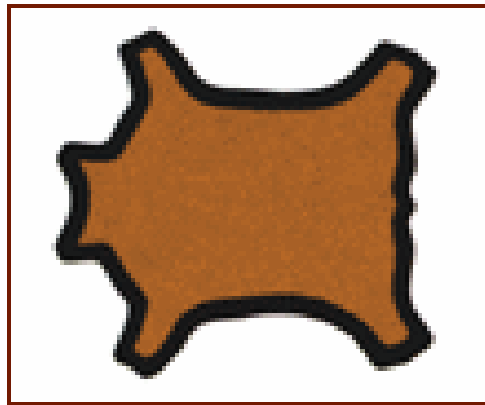
Step 6: Rolling

- Rolled through a machine to make stronger
- Dried by hanging or dry tumbling



Step 7: Finishing

- Finished with coatings of acrylic, urethane, vinyl, wax, nitrocellulose, dye, or other materials



Environmental Impact

- Air pollution
 - ammonia gas, hydrosulphuric gas and volatile organic compounds
- Water contamination
 - residual baths for hide treatment and washings containing chemical products
- Contamination of the soil
 - flesh, hairs, hide chippings and scrapings
- Large amount of water consumption
- Chrome has high level of contamination



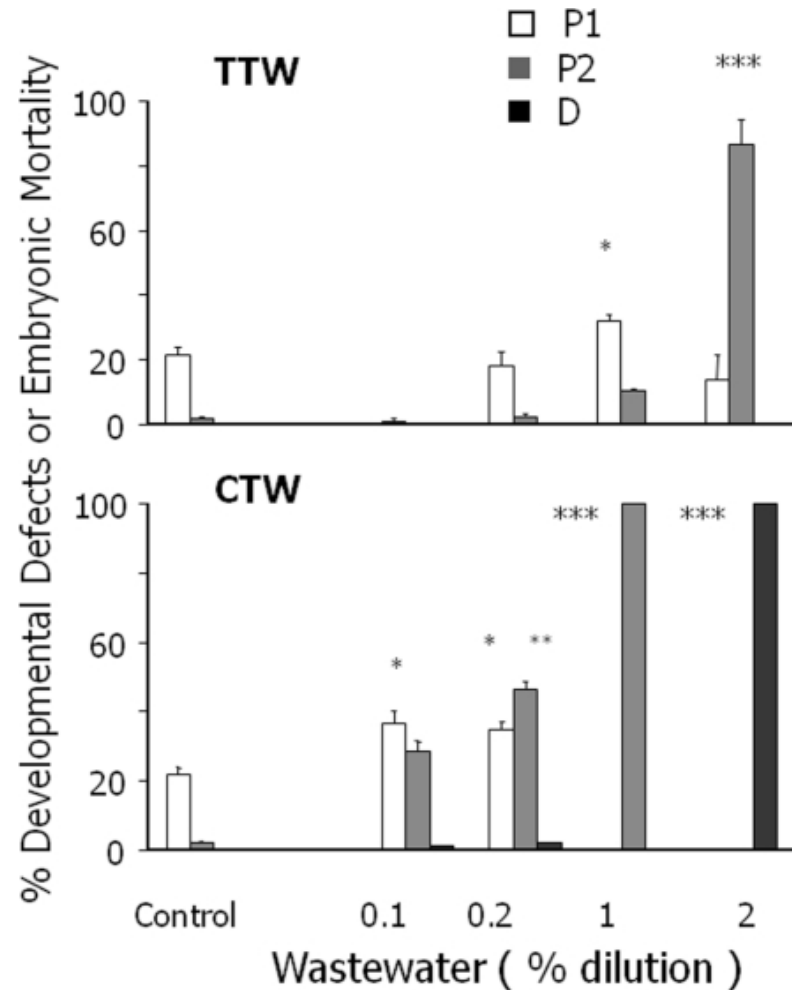
Ways to Reduce adopted by Tregus

- Reuse water
- Recover and reuse chrome*
 - New process- improved chrome syntan with more than 90% uptake of chrome
- Use ammonia-free deliming
- Use less salt (although will decrease “shelf-life”)



Vegetable vs. Chrome

- Study of toxicity was evaluated by multiple bioassays including developmental defects and loss of fertilization rate in sea urchin embryos and sperm, and algal growth inhibition



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