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## **Leather for Life**

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Modern leather tanneries and the leather they make are frighteningly toxic. So toxic, that there are more tanneries than any other business on the Environmental Protection Agency's (EPA) Superfund list, the list that identifies the priority environmental cleanups in the U.S. So toxic, that 95% of U.S. tanneries have moved their operations overseas to avoid environmental oversight penalties. So toxic, that many old tannery sites can't be used for agriculture or built on or even sold.

Leather making wasn't always a toxic activity. Originally, ancient peoples all over the world used benign wood smoke and natural oils to make soft and durable leather very similar to today's chamois. With the advent of agriculture, bark tannage came into use. This new method yielded firmer, denser leathers, which were well suited for horse gear, hard-soled footwear, belts and armor. In addition, alum, a naturally occurring mineral salt, was used in many desert regions to make soft leather that retained a smooth-grain surface. As societies grew and ideas traveled, these tanning methods were combined to create a wide variety of leathers that met a wide variety of functional needs. Before plastics, leather was what you reached for when you needed something very flexible yet very strong.

In the eighteenth and nineteenth centuries, virtually every U.S. town had a tannery to service the local populations' need for footwear, horse gear, gloves and the like. As the industrial revolution began to grow, manufacturing became more specialized and concentrated in various regions, but was still done with the same natural materials as before. The chief negative environmental consequence became the increased quantity of effluents being dumped into waterways.

In the 1870s, as the chemical and industrial revolutions merged, a new method of

tanning based on hexavalent and trivalent chromium (chromium (VI) and (III) respectively) was developed. By 1890, it had entered into commercial production and was quickly becoming the dominant tanning method. Quick and permanent, chrome tanning creates soft leathers, dyes easily and lends itself nicely to mechanization. Unfortunately, the chemicals used are also extremely poisonous and persistent in the environment. In addition to chromium, modern tanneries typically use synthetic chemicals such as sodium sulphide, formaldehyde, glutaraldehyde, sulphuric acid, various solvents (which release volatile organic compounds), bactericides, paints, dyes, degreasers and surfactants.

In the late twentieth century, the tanning industry's heavy use of chemicals came under intense scrutiny. The reaction of the leather industry has taken three forms: lobbying the EPA to relax rules or to not implement them; moving tanneries offshore—primarily to China and India—where there are no (or less stringent) environmental rules; and mitigating and cleaning the effluent that they do create. While this last effort is a measurable improvement over past practices, nevertheless, many worrisome toxins cannot be completely eradicated, and those still constitute a huge problem. As a result, the tanning industry all but disappeared in the U.S. Most remaining operations focus on the finishing (re-tanning, dyeing and softening) of hides that are chrome tanned off shore.

Chromium (VI) is the most persistent toxin used by the leather industry. It is a known carcinogen with the following documented human health effects:

- Skin rashes
- Upset stomachs and ulcers
- Respiratory problems
- Weakened immune systems
- Kidney and liver damage
- Alteration of genetic material
- Lung cancer
- Death

Because of these, most tanneries have switched to chromium (III), which is considerably less toxic. However, chromium (III) commonly oxidizes into chromium (VI) during the tanning process. As a result, the finished leather and the tanneries' effluent often contain chromium (VI).

Even as a compound in finished leather products, chromium (VI) is known to cause allergic reactions such as skin rashes and ulcers, and because of its oxidized nature, it easily moves across membranes such as human skin. According to the EPA, 95% of all leather produced has been tanned with chromium. If you own a leather jacket, shoes composed partially or entirely of leather, a leather handbag, leather upholstery or the like, you can be virtually assured that it has been chrome tanned and that you have been exposed to chromium (VI).

Thanks to consumers' increased environmental consciousness, steps have been taken to create natural leather. In Europe, there is a large movement to eliminate chromium from leather, generally by replacing it with glutaraldehyde, syntans and other metallic salts such as titanium and phosphonium. Syntans are manmade tanning agents that come in a wide variety of forms. Some are known carcinogens and environmentally hazardous, and some haven't been tested enough to know one way or another. The main advantage of these chromium substitutes is that once the tanning is done, the chemicals are bound firmly to the leather and do not pose a serious health risk to the consumer. They are, however, very dangerous to the tannery workers and to the environment.

Our brand, Organic Leather, focuses on creating high-quality and stylish leather goods as we work to transform the leather industry and educate consumers. Organic leather, the material, returns reverence to the practice of working with leather. It pays homage to the tribal peoples of our world, and it encourages respect for the quality of animals' lives, from the way they are raised to the way they die. As a byproduct of the meat industry, harvesting hides and skins for leather does not encourage the killing of more animals. Rather, it makes sure that no part of the animal already being harvested goes to waste. Moreover, we are strongly concerned with the chemicals used in the tanning and dyeing processes and their effects on the natural environment and the health of both workers and customers. Because of these considerations, we have chosen the farmers and tanners that we work with very carefully, developing partnerships to create change in the leather industry.

From our experience, people who are educated about leather would prefer to wear the skin of an animal that was treated with respect; they want to minimize the amount of toxins in the water and wear a material that does not threaten their health. Of course they also want their leather to be beautiful, supple, and strong. The leather we use in our designs satisfies all these desires.

At present, Organic Leather uses three grades of leather, which we define ourselves. There are two parts to being certified organic leather. One is that the animal has been raised organically and the second part is that the tanning is organic through the use of plant and non-toxic materials. The three grades we use are:

- 1) Certified organic leather comes from certified organic livestock that is then organically tanned.
- 2) Natural leather comes from animals raised on small family farms that have been humanely raised but have not received organic certification and they have been organically tanned.
- 3) Naturally tanned wild harvested leathers come from wild game animals, such as deer, that are hunted in a sustainable fashion and then tanned with our organic tanning process.

For the consumer to trust that the leather they are buying is truly green, and to encourage tanneries to produce truly natural leathers, it helps to have a third-party certification program. The USDA National Organic Program (NOP) certification is a start, and we are in the process of becoming the first tannery in the U.S. to attain that standard. However, under current USDA NOP rules, organic leather must come from an animal that has been raised on a certified organic ranch, and then tanned in a certified organic tannery. It would be preferable to have a certification specific to the leather tanning process—“certified naturally tanned,” for instance. There are many animal skins that are naturally raised but do not qualify as organic for one reason or another. There should be an incentive to tan these naturally. We’d like to take every hide we can get our hands on, tan it naturally, get it into the hands of consumers, rinse, and repeat.

In order to bring leather tanning back to an ecologically balanced position we need to use natural tanning agents such as tannins, alum, earth minerals, fish oils and wood smoke. All of these are still used in modern tanning methods, albeit usually combined with chrome or other chemicals. By applying natural agents in a modern manufacturing context that takes advantage of advances in clean technology, we can turn the tanning industry around.

Natural tanning can be done using the same modern machinery employed by chemical tanning. Granted the cost, while still very reasonable, is somewhat higher due both to the fact that this is a small, new industry and because the harsh chemicals are occasionally replaced by hand work. At this point, one significant cost entailed by the organic tanner is hide transportation. Compared to conventional ranchers, organic ranchers are literally few and far between, which results in the tanner having to truck smaller quantities of hides from multiple locations, which tend to be located further from the tannery. The organic tanner may also need to pay a slightly higher price for the organic hides so that the ranchers will not sell them to the non-organic hide buyers with whom they have established relationships. These added costs, though significant at present, should largely dissipate as the organic meat industry continues to grow.

Further costs are incurred due to the longer-than-conventional tanning process. Modern conventional tanning chemicals, such as sodium sulphide, cut the time required to soak and de-hair hides from about a week to mere hours. They are so potent, they turn the hair into pulp and allow the entire de-hairing process to take place in a large spinning drum without human interference. The hides stay in the drum throughout the wet stage of the tanning process while different chemicals are added and drained out as required. Of course, the downside to this convenience is the fact that the chemical-laden pulp ends up in the sewage system, where it binds with oxygen, leaving none for the aquatic life.

Without sulphides, hides must be soaked in hydrated lime for a week until the hair can be pushed off by machine. This process is imperfect, so each hide must be inspected and de-haired by hand as needed. The longer tanning process requires considerably more capital and therefore entails more risk for the tanner. In addition, obviously, the labor cost difference is huge—*but so is the environmental impact*. The conventional tanning industry has spent time and money trying to remove sulphides from the de-hairing process. So far, however, it has only mitigated their use on the grounds that financial profit outweighs cost to the ecosystem.

As these examples illustrate, some organic leather tanning costs are driven up by the natural inefficiencies of scale. We expect these to dissipate as the industry grows. Others are caused by technological failings. These may or may not be solved through research and development.

We have started working with willing tanneries in the U.S., helping to replace ones that have moved overseas or have been closed down. (We are also building fair trade partnerships with tanneries in developing nations, helping them convert from chemical to natural processes.) Because they use natural agents, our partner tanneries' waste is completely benign (it can even be shoveled onto fields as fertilizer); their workers enjoy safer conditions, and last but not least, the end product is safe for the consumer. Meanwhile, the quality of the leather is not compromised. Naturally tanned leathers are beautiful and can be produced in a wide variety of thicknesses, colors, and with performance characteristics such as washability, breathability or water-resistance, stretchiness or firmness, drape or rigidity.

Natural tanning proceeds roughly as follows: The frozen or salted skin is rehydrated in fresh water and then soaked in a de-hairing solution, typically composed of hydrated lime and an enzyme. Historically, this enzyme resulted from allowing the leather to decay. Thankfully, scientists have isolated the relevant enzyme, allowing us to skip that stage. Next, the skin is mechanically fleshed and de-haired, and the lime is neutralized.

The skin is then soaked in whichever tanning agent will impart the desired quality of leather: alum for soft grain leathers; cod oil or wood smoke for soft, breathable, washable suedes; and plant tannins, which, depending on type, create either dense, thick leathers (think belts or saddles) or soft grains and suedes. Tanning agents can also be combined to achieve desirable qualities. Alum plus woodsmoke yields soft, washable grain leathers. Alum plus sumac or gambier tannins yield soft yet durable leathers that dye easily. Wood smoke plus tannins produces similar qualities but with improved washability.

After tanning, the skins are dyed (or not), oiled, dried and softened. They can then be buffed or polished depending on the finished surface desired. Colors readily available to the natural leather tanner include white, creams, yellows,

tans, browns, reddish browns, blacks and reds. These colors are attained through the tanning process (alum-tanned hides are white; smoked hides are various hues of cream, yellow, golden or brown; oil-tanned hides are a classic buckskin yellow; tannin produces cream, yellow, tan, red and browns). Tannin-based dyes can also be used after tanning to create any of the tannin colors or black with the addition of iron salts, without significantly changing the nature of the leather. Cochineal (a beetle that grows on prickly pear cactus and is commonly known as Carmine) makes a variety of reds and lavenders. Blues and greens are possible, but not as colorfast.

At the time of this writing, our designers at Organic Leather work with a somewhat limited palette of colors, qualities and textures. The number of options will dramatically increase as the industry grows; however, the fact remains that organic leather tanning cannot achieve all the effects that chemical tanning has made us accustomed to, for instance uniform deep colors, and the rubfast high gloss of patent leathers. Nevertheless, for conscientious designers, knowing that the material they use is sustainable and aesthetically current allows creativity to flow freely.

When we started this business, we asked ourselves a very important question: How do we produce a material that can be used in a beautiful design that honors the environment, that has incredible longevity and durability and that creates a product that consumers will love? With organic leather, we believe we have answered this question. Leather grows and changes as you wear it and is one of those magical materials that gets better and better with age. We are not simply creating a fashion brand that follows the seasons or trends, but a brand for life.