



Technology

Many by-products from leather manufacture, that have traditionally been treated as waste, are now being viewed as 'new raw materials'. With waste being categorised according to its composition and the possibilities of control by legislation, disposal costs continue to rise. This means that although the conversion of a new raw material into a useful product may not be cost effective in normal manufacturing terms, these costs are offset by the rising costs of traditional disposal. Here are some techniques that are being used or developed for by-products that were previously considered problematic.

Waste creates new growth

Fleshings

Fleshings are being used for various purposes. In India, a major recycling plant now dries and pulverises both raw and limed fleshings for use as a high protein supplement for chicken feed. In Europe, fleshings are being compressed under high pressure for grease extraction. This can be purified for tallow or, thanks to its high calorific value, can also be used as boiler fuel.

Hair

The problems of hair disposal have increased due to a shift from processes that chemically dissolve hair towards ones that save hair. This is to reduce the strength of tannery effluents. Unfortunately, the residual hair is unsuitable for use in products like brushes, natural felts or fillings.

Although hair is naturally very stable, if mixed with suitable materials, such as farm manure or biodegradable materials from domestic sources, it can be composted. This procedure is being used on a fully commercial scale in both Europe and the USA to produce valuable soil conditioning products. Other routes investigated include biodegradable pots for seedlings and biodegradable adhesives.

Hair and fleshings have also been used for the production of bio-gas. When added to pig manure, that is broken down biologically to generate bio-gas, both hair and fleshings have boosted gas production. The gas is then burned to provide hot water for heating greenhouses or to run generators with electricity sales to the national grid. Solid residues in a coarse, dry powder form are used for ground conditioning and the liquid can be applied directly as a nitrogen-high fertiliser.

Chrome shavings and trimmings

In the USA, chrome by-products have been broken down using a combination of heat and alkali to produce a pure protein hydrolysate and chrome cake. The hydrolysate has found many applications. One is as grass feed for golfing greens, where the small molecular size has resulted in good breakdown under cold conditions and has extended the commercial season.

Other uses include feed for pigs and, when added to water spray used for dust control, has resulted in a protein encapsulation of phosphate dust, which is valuable for agricultural use. The product also forms a stable foam, creating uses within fire control and for the short-term surface sealing of solid waste disposal sites.



Main avenue of the Tamil Nadu wood showing two year's growth

Sludges

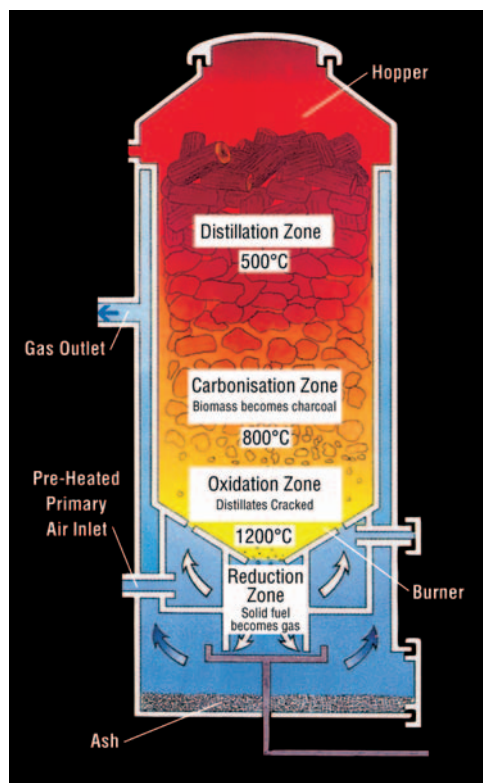
Various approaches have been tested to produce bio-gas from high volume tannery sludges. In India, where considerable amounts of sludge are produced from plants treating the combined effluents from many tanneries (Common Effluent Treatment Plants or CETPs), a major gasification plant has been established. Sludges from effluent treatment and fleshings are both biologically digested, resulting in a significantly reduced volume of solids. The production of bio-gas provides a valuable energy source.

Solid wastes

Gasification provides a major route for treating solid wastes of many types. Often termed as the ultimate solution, the system operates by the automatic feed of solid waste into a gasification unit. In general, briquettes of solid waste are fed into the top of the reactor and heated in the absence of air. This causes a breakdown of the organic matter (distillation) and the production of various combustible gases, mainly carbon monoxide, methane and hydrogen.

As the solids, now in the form of a charcoal containing inorganic matter, pass down the reactor towards the base they are finally combusted to produce an ash. Part of the heat from this stage is used for distillation and any pre-drying of the waste. The gas can be used for heating water or for fuel to generate electricity.

This technology is gaining momentum. The plant can be quite small, to the extent that it can be fitted into a small container for ease of delivery and immediate use. Fuels include packaging waste from supermarkets, pulverised paper and wood chippings, sewage waste, poultry/pig/cattle litter and food that has passed



Gasification of solid waste

The waste is fed into the top of the hopper. As the amount of air is strictly controlled, the volatiles and gases are produced in the initial stages without combustion. These gases, chars and residual solids are subjected to temperatures of 1,200°C as they down-flow through the unit. The gas produced is clean and combustible.

its sell-by date.

With some industrial applications it is better that the waste is blended before compaction and briquetting. It is also important that the characteristics of the solids are known and are reasonably uniform so that the process can be best managed and the outcome predicted. In some situations it may be necessary to scrub or treat the gases to remove particulate or noxious gases. Although it cannot be considered an easy technology to manage, it is currently under active investigation for the disposal of leather waste and dried tannery sludge.

Tannery effluents

Even tannery effluents are being put to useful purposes. In Australia, it has been demonstrated over many years that partially processed effluents can be used for land irrigation, resulting in improved soil quality and increased crop yields. However, careful attention is required within the manufacturing process, in particular to minimise salt content of the effluent and to separate chrome residues for separate treatment.

In the State of Tamil Nadu, India, the treated effluent from a CETP producing up to 2200m³ per day is being used for land irrigation. In this situation the effluent has a low salinity and this has led to the cultivation of a wooded area containing a mixed variety of 25,000 trees in an area that was previously barren (*see title image*). 

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