



TANCHEM INDUSTRIES, MEERUT AND NASSER TANNERY COMPANY, VANIYAMBADI (India)

ABOUT THE COMPANIES

Tanchem Industries, Meerut is a small-scale tannery processing about 200 buff calf hides (or an equivalent quantity of cow or buffalo hides) per batch. In a year, it processes about 48 batches and employs around 30 workers in all. The unit, which is located in the northern part of India, produces nappa, oil pull nappa and other varieties of leather used by the garment and shoe manufacturing industries.

Nassau Tannery Company, Vaniyambadi is a medium-scale tannery that processes about 2500 sheep/goat skins per batch. In a year, it processes around 300 batches. The unit, which is located in the southern part of India, is 100% export-oriented and produces suedes, nappa, nubuck and other varieties of leather for garment and golf glove manufacture. It employs around 175 employees and has an annual turnover of about RS 2 billion (US\$ 45 million).

These two companies represent between them many of the main characteristics of the tannery industry in India and allow an assessment of how issues of scale affect environmental and economic performance in the sector. Moreover they allow a comparison of the different leather production processes used for hides and skins.

WHY GP?

COMPETITIVENESS

Indian tanneries are generally outdated, use obsolete technology and depend excessively on traditional skills. This means that their productivity is well below the norm for tanneries in developed economies such as Europe. However, exports from the leather sector constitute seven percent of India's export basket, making it one of the nation's top five export earners. Now, in the wake of the globalisation of the Indian economy and the liberalization of economic and trade policies, the industry is poised for further growth to achieve a greater share in the global market. Environmental excellence coupled with much-needed productivity

improvements will be vital to fully capitalize on this opportunity.

ENVIRONMENTAL IMPROVEMENT

Liquid wastes comprise the vast majority of pollution from tanneries. In general, these wastes have high biological oxygen demand (BOD), high concentrations of suspended solids, dissolved solids, oils and grease. Effluent may also contain chrome, sulfide, nitrogen and other chemicals. Improperly treated tannery waste water has severe impacts on surface water, ground water and soil quality and there have recently been mass closures of tanneries in the State of Tamil Nadu in response to this problem. GP is therefore vital to promote the establishment of environmentally friendly factories and to show that environmental protection and profitability can be harmonized particularly in SMEs.

To implement GP the companies used the methodology described in the introductory chapter.

MAIN ISSUES

The production of finished leather from raw hides and skins can be grouped under three major operations (see Fig. 1): Beam house operations; tanning operations; and, post tanning operations. All aspects of these operations were found to be potential sources of waste generation, although the beam house operations — where the raw hides are cleaned and prepared — was found to contribute over 50% of the tanneries' total pollution load.

WATER POLLUTION

As expected water pollution was found to be the main problem, with large volumes of waste with high BOD, COD, TSS and TDS produced from each unit. The impact of these pollutants was varied, and included human health problems due to waste from the spent chrome bath, soil contamination from liming waste water and ground water pollution from soaking wastewater.

Causes of this pollution included: process inefficiencies (eg. the problem of unfixed fat liquors due to the use of cold water); spillages (eg. chemicals at the neutralization stage); unoptimised and inefficient processes (eg. at the soaking and pasting stages); and, a lack of accurate measuring due to a lack of necessary machinery (eg. in the deliming, bating and degreasing stage). Poor quality control, impurities in the chemicals used, an unskilled and untrained work force and a lack of water recycling infrastructure were also highlighted.

SOLID WASTE

It was also found that a large amount of solid waste is generated from the tanneries. The major sources were unhairing, liming mud, fleshings, splitting, shavings, trimmings and buffings amongst others. However, all solid waste generated from the tannery has a market value and is sold to local vendors who come to the unit

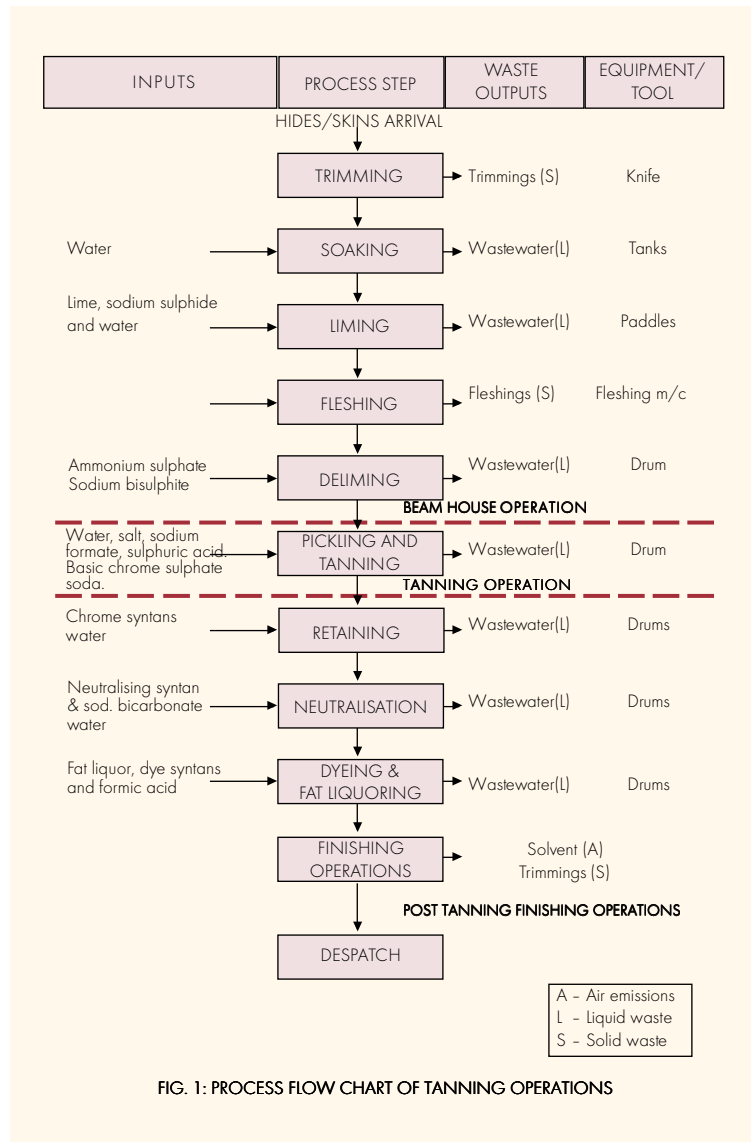


FIG. 1: PROCESS FLOW CHART OF TANNING OPERATIONS

to collect it. For example fleshings are used in the fertilizer industry, while even finished leather trims are used by cobblers for patch work.

Material balances were drawn up for both units and a cost analysis was done on the waste streams they produced. The waste stream from the BuffCalf process in Tanchem Industries was calculated to cost about Rs 2,830/batch (US\$ 63) due to chemical loss and treatment costs. For Nasser Tannery the total cost of its waste stream was Rs 8,166 per batch (US\$ 182). The company consumed about Rs 1,750,000/month (US\$ 39,000/month) of chemicals.



GP SOLUTIONS & IMPLEMENTATION

Based on a cause analysis, material and component balance, literature survey and brainstorming among team members and experts, green productivity options were developed. A total of 45 options were developed for Tanchem Industries' hide-based process and 59 for Nasser Tannery's skin-based process. These were divided into good housekeeping, process modification, material change, elimination & reduction, equipment modification, technology change and recycle, reuse and recovery.

GP options ranged from changing the felt on the roller of the sammying and setting machine (to ensure uniform pressure and a better grip on the hides) to the implementation of 'green' fleshing immediately after soaking (to reduce the use of lime and sulfide and to allow reuse of fleshings at the end of the process.) The options were assessed in terms of their implementation feasibility. Over 70% of the feasible options were implemented.

BENEFITS OF GP

Many of the implemented options were found to give substantial economic and environmental benefits.

For example, in the hide-based process, a reduction in the use of fat liquor from 18% to 8% of the weight wet blue (along with some process modifications) involved little expenditure. These changes, however, reduced organic load and brought economic benefits worth Rs 175,900 (US\$ 3,926.5). In the skin-based process recovery of chrome from the spent tanning bath and the tanning wash resulted in less chrome load to the environment, the elimination of chrome sludge from the ETP and a cost saving of Rs 727,000 (US\$ 16,235) per year. Given an initial investment of Rs 316,000 (US\$ 7,060) this translates into a payback period of less than six months.

Overall water consumption dropped by 2,000 litres per batch of 850kg buff calf hide and by 20,000 litres per batch for skins. Both the hide-based and skin-based processes' wastewater showed reductions of BOD, COD and TDS after the implementation of the GP (for details see Table 1).

	TANCHEM	NASSER
Reduction in COD Load (% Reduction)	19.1 kg/batch (10%)	157.2kg/batch (17.2%)
Reduction in BOD Load (% Reduction)	3.7 kg/batch (5.8%)	31.8 kg/batch (15.1%)
Reduction in TDS Load (% Reduction)	5kg/batch (1%)	1046.8 kg/batch (40.5%)

Table 1: Improvements in the Quality of Wastewater



One of the major achievements of implementation of GP solutions was that the marketability of products from Tanchem Industries was found to have increased by over 4.3 times. The unit's productivity also rose to about 210 batches per annum.

CONCLUSION

The GP programs at Tanchem Industries and Nasser Tanning Co. showed that the application of creative thinking can result in financial benefits for a factory while allowing it to comply with regulatory requirements. The implementation of GP at the two sites also showed that a step-by-step program could provide an effective way for both small and medium-sized enterprises to generate green productivity options.

“This project introduced a systematic approach to continuous improvement in environmental performance and productivity. Among the changes we observed was a shift in the approach and attitude of our employees — they were very much concerned about wasted resources and took all steps and measures to reduce losses.”

**Mr. A.G Naser Ahmend
Managing Director
Nasser Tanning**

“The most important gain of our GP program has been that we developed confidence amongst ourselves that we could cut down our cost of production and also produce eco-friendly products without compromising on product quality.”

**Mr. Mohammed Sajid
Managing Director
Tanchem Industries**

Video available for this case study from:

NATIONAL PRODUCTIVITY COUNCIL (NPC)

Institutional Area, Lodi Road
New Delhi--110 003, India

Phone: (91-11) 4690331, 4690332,
4690333

Fax: (91-11) 4615002, 4626986,
4698878

E-mail: npc@ren02.nic.in

Web site: <http://www.npcindia.org/>