

THE ALFA CHARTER

ADOPTED AT THE ANNUAL GENERAL BODY MEETING HELD ON 24 APRIL 2006

- To act as a global resource hub for information on the world wide consumer market for leather and leather based products like foot wear, travel ware, party ware etc. and non-leather supplements to leather.
- To disseminate information on products and technology among technologists, artisans, designers and retailers through an IT enabled mode.
- To act as a beacon for budding technologists, artisans and designers towards guiding them to successful career in their chosen field of activity.
- To address societal issues like safe environment, animal care, safety at work and safe & proper disposal of used leather products & non-leather foot wear.
- To act as an extended arm of the ALMA MATER (viz. A.C.Tech., CLRI, Anna University) in propagating the developments and achievements to the stake holders, government and society.
- To promote fellowship among the alumni base of the AC Tech Leather and Footwear technologists and promote professionalism in leather education, research, industry and market and trade.

REMINISCENCE OF GSN MURTHI ALFA LIFE TIME ACHIEVEMENT AWARD

When I received a letter from Dr Sreeram asking me for an article for the souvenir, I was totally at a loss to find what I could contribute. As a Karma yogi, I only worked at producing leathers and was not at all adept at writing, nor am really up to date with the latest advances in either leather processing or theoretical leather chemistry. However, I shall try to recount a few anecdotes from my long professional career spanning over 50 years.

SPECIAL FINISH LEATHERS

When we first produced resin finished leathers (those days only glazed cow sides were available) for ladies' shoes we did not want other factories to know the method of finishing and so called the leather "special finished" sides. Later, resin finished cow sides came to be known as special finished leathers throughout India for a long time!

GLOKAF

When metallic finishes were not known and solvent soluble dyes were not introduced in India, I wanted to make metallic finished leather in the early 60's. In the paint industry aluminium paste was given separately to be mixed with a vehicle for producing aluminium paint. I took this aluminium paste, mixed it with a pigment paste made by using a solvent instead of water, and then used this mixture with a clear lacquer to produce a colored metallic finish of sorts. This lacked the brilliance or transparency of metallic finishes available today. This was then sprayed on pigment-resin finished leather. Thus metallic finished leather was produced and we called the leathers *glokaf*. This leather was a rage in the local markets in those days. Today, with the introduction of solvent soluble dyes and "Pearl Powders" and their incorporation in clear lacquer for making brilliant colored metallic leathers available, *glokaf* would look very crude, but in those days, it was a rage for want of better material!

In September 1972, I joined Tata Exports (Now Tata International Ltd.) as General Manager to organize their Leather Division for which Dewas in Madhya Pradesh was chosen. In the early stages of planning I had several interesting interactions with the top management.

TREE PLANTATION

The then chairman of Tata Exports – he was also chairman of the TELCO (now Tata Motors) was a very venerated figure in the Tatas. He wanted a large number of trees planted in the 100 acres of land in which the factory was to be situated and I was rather reluctant to agree to this proposal because of my worry at what it would cost (I had a very tight budget allocation!). But the chairman said that any industry would consume a lot of oxygen and it should put in more oxygen into the atmosphere than it would consume so that society would not be adversely

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affected by the industry. We planted one lakh trees and I was so impressed by the argument, I myself planted with my own hands four hundred trees.

HEIGHT OF THE FACTORY BUILDING

The main building planned for linear flow of material without any back tracking was 180 meters long and 80 meters wide. While discussing the matter with the chairman, he asked me what the height should be. Being an engineering company and as no cranes were involved, I said seven meters would be sufficient (I was always thinking of keeping the cost down!). He said that apart from an aesthetic point of view, a greater height was needed for a different purpose as well. He said "Murthi, Dewas is a hot place and a higher roof will keep the factory cooler. A cool working place keeps the workers happier and a happy worker gives better productivity". I was definitely impressed and the height was kept at 10 meters at the ebb and 13 meters at the crest.

WATER SUPPLY

The M.P. Government as an incentive to attract us to M.P, offered water at a very highly subsidized rate from a barrage to be built across the river Shipra. I insisted on our own captive water supply to which the M.D. was reluctant, as we would get water promised by the government. I was adamant and as water was very important, insisted on our own source. Three bore wells were sunk in addition to two surface wells already in the land. To this date the barrage has not been built!

PU FINISHED LEATHER

The MD wanted me to examine the question of obtaining help from *Utanno* – at that time one of the largest and most successful cow hide tanneries in Europe. Their PU finished leathers were very successful. I visited their tannery. They had no goat or sheep skin production. I proposed that we could agree to a 5% royalty on PU finished leather if they could pass on the technology and if they could market our leathers on a commission basis. Their counter proposal was that we pay royalty on our entire production including sheep and glace kid which was already very well known in Europe. Their justification – we would be using the same technology in our skin production. This avaricious proposal I rejected and the proposal fell through. I designed our own plant with warm and dry air and using a curtain coater for coating Bayer's PU products, successfully producing good PU leathers. To this day Tatas are probably one of the few plants producing quality PU leathers.

Altogether it was a very rewarding experience where I had excellent co-operation with a band of highly committed colleagues.

CONSULTANCY

My consultancy period was not highly spectacular. I utilized my knowledge earlier gained usefully.

There were many more interesting episodes but I would like to end this note with a word of thanks to the editorial board for giving me an opportunity to share them.

GSN Murthi

DOWN MEMORY LANE: SHRI GSN MURTHI AT AN AGB MEETING OF ALFA

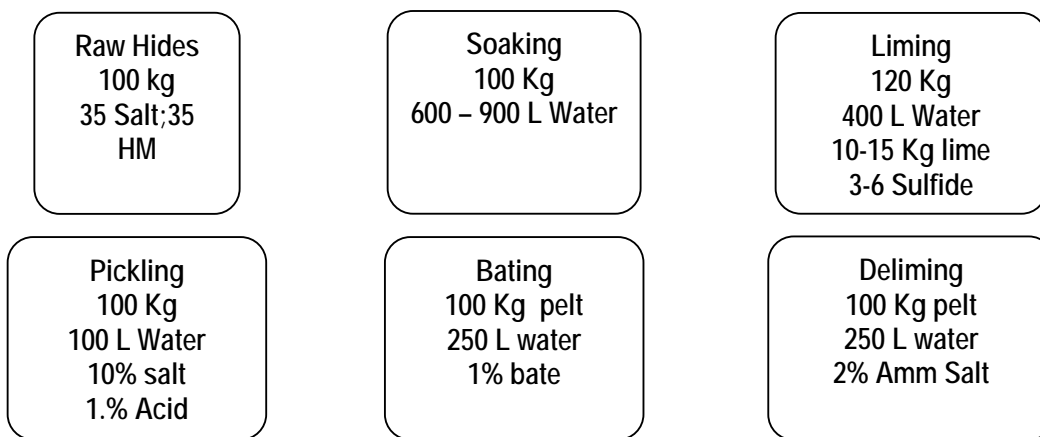


ENVIRONMENTAL TECHNOLOGY PARADIGMS FOR LEATHER

T RAMASAMI

TALK DELIVERED AT PTIET, PALLAVARAM AS A PART OF THE ALFA TECHNICAL SYMPOSIUM ON REVERSE OSMOSIS: ITS ROLE IN LEATHER INDUSTRY

MATERIAL BALANCE IN BEAM HOUSE OPERATIONS



DISCHARGE LEVELS IN LEATHER PROCESSING

Parameter	Soaking	Liming/ reliming	Deliming	Pickling	Chrome	Neutralizat	Rechrom	Total (includin
Volume of effluent/tonne of	6-9 m ³	3-5 m ³	1.5-1 m ³	0.5-1 m ³	1-2 m ³	2-3 m ³	3-6 m ³	30-40 m ³
PH	7.5 – 8.0	10.0-12.8	7.0-9.0	2.0-3.0	2.5-4.0	4.0-6.5	3.5-4.5	7.0-9.0
BOD 5 day at 20°C: (Total)	1,100-2,500	5,000-10,000	1,000-3,000	400-700	350-800	800-1100	1000-2000	1200-3000
COD (Total)	3,000-6,000	10,000-25,000	2,500-7,000	1000-3000	1000-2500	2000-4500	2500-7000	2500-8000
Sulfides (as S)	-	200-500	30-60	-	-	-	-	30-150
Total Solids (TS)	35,000-55,000	24,000-48,000	5,000-12,000	35,000-70,000	30,000-60,000	10,000-14,000	4000-9000	12,000-23,000
Total Dissolved Solids (TDS)	32,000-48,000	18,000-30,000	3000-8000	34,000-67,000	29,000-57,500	9000-12,500	3600-8000	9000-18,000
Suspended Solids (SS)	3,000-7,000	6000-18,000	2000-4000	1,000-3,000	1,000-2,500	1000-1500	400-900	2000-5000
Chlorides (as Cl)	15,000-30,000	4,000-8,000	1,000-2,000	20,000-30,000	15,000-25,000	1500-2500	300-1000	6000-9500
Sulfate as SO ₄	800-1500	600-1200	2000-4000	12,000-18,000	12,500-19,000	1000-2000	1200-2500	1600-2500
Chromium (as Total Cr)	-	-	-	-	1500-4000	15-30	50-300	120-200

CURRENT SCENARIO OF LEATHER SECTOR IN TN

- Connected to pollution control devices
- Capable of complying with 30 BOD and 250 COD norms as well as chromium management needs
- Enforced to adopt Secured Land fill for solid wastes and zero liquid discharge
- Membrane technology options for water renovation, recovery and reuse and evaporation of reject streams of saline wastes are enforced solution
- 18 tanneries have already started implementing zero liquid discharge mode options
- What is the lesson learnt?

MEMBRANE TECHNOLOGY OPTIONS FOR TREATED WASTE WATERS FROM TANNERIES

- Technologies exist and is complete with pretreatment systems
- Robust Membranes are in the market
- Consulting companies provide solutions and services
- Generally 70-80% water recovery from treated waste waters is feasible
- Costs for the recovered water works at Rs 400-600 per meter cube
- Costs of the option work out at Rs 0.45 to 0.80 per square foot of leather based on product mix

HOW FEASIBLE OR OTHERWISE?

- Saving of wet finishing chemicals through the use of RO water is reported; in some cases to the tune of 15-20% is observed.
- In cases where 15-20% saving of chemicals is feasible, 36 million sq ft of leather production in three years will be justified for every crore of plant investment

AMBIENT PRESERVATION

Challenge: To preserve skin against spoilage without drying or dehydration and store at ambient temperature and pressure for at least a month

Approaches selected

- Identification of micro flora responsible for skin spoilage
- Bio preservation
- Use of botanicals
- Chemical alternatives to common salt
- Take into account of ease of use of the selected approach
- Standardize a series of salt-less curing methods

SCOPE FOR AMBIENT PRESERVATION WITHOUT SALTING AND DRYING

- Data base on skin spoilage micro flora
- More than 140 cultural extracts of aero and skin micro flora have been collected and specific organisms involved in skin spoilage have been recognized.
- Bio preservation method
- Some antagonistic micro –organisms to the skin spoiling organisms have been identified based on an analysis of microbial dynamics of the putrefaction process. Bio preservation of skin using microbial cultures for periods exceeding 4 weeks has been recognized. *(Two culture consortia have been recognized for further work up)*
- Ambient preservation using natural products
- Potentials of the use of seven natural materials in ambient preservation of skin have been recognized. (Of the total of seven leads obtained and two have been shown considerable promise for applications in decentralized supply chain)
- Salt less chemical preservation
- Cultural homogenates containing anti-bacterial compounds, CTAB, Silicates (through another parallel project in CLRI), some heterocyclic compounds have been identified to enable ambient preservation. *(four gainful leads have been obtained for further evaluation)*

AMBIENT PRESERVATION THROUGH NATURAL PRODUCTS

A formulation has been developed based on commonly available botanicals and applied under real field conditions in some villages in MP by involving traditional artisans. A ready to use formulation has been standardized.

Successful ambient preservation at an offer of about 6% on wet weight of skin over a period of 1 month has been feasible. The process seems to receive ready acceptance from artisans. Leather making qualities have been assured.

SALT LESS PRESERVATION: CHEMICAL APPROACH

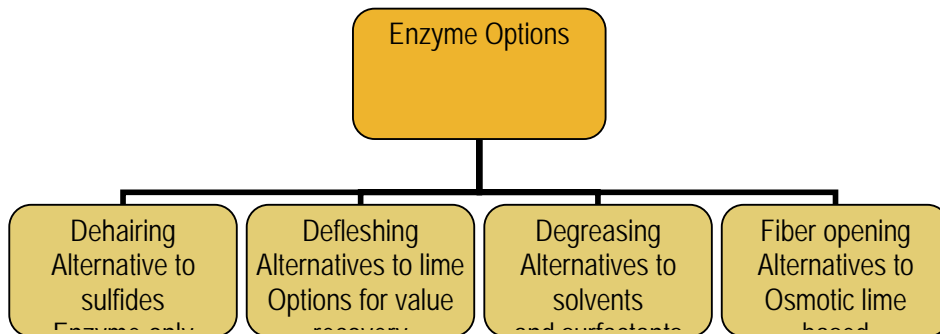
- Some cultural supernatants bearing anti bacterial for skin preservation have been employed for skin preservation with success
- 0.1% solution of CTAB preserves skin for more than one year.
- Some interesting leads have been obtained for skin preservation by natural products. Bio active molecules from these leads offer scope for chemical preservation without the use of common salt.
- Silicates have been successfully employed by CLRI recently through another global network. This offers scope for combining some anti-bacterial leads with silicates and optimize efficacy.

ENZYMES IN LEATHER PROCESSING

Transition from enzyme assisted to enzyme only processing

For making beam house (pre tanning) operations cleaner and sustainable

ENZYME ALTERNATIVES TO LEATHER PROCESSING



ENZYME (LIME & SULFIDE FREE) DEHAIRING

- 38 enzyme samples from various groups screened; 8 lead samples (proteases) short listed; All 8 short listed samples are free of collagenase activity.
- Lactobacillus strain affords clean and safe dehairing
- Universal NMITLI substrates have been synthesized.
- A application assay has been developed
- Up scaling trials for seven of the lead enzyme products have been initiated.(2-22.5 liter batches have been worked out)
- Preliminary cost estimates have been made based on cost of raw materials
- Enzyme zymograms have been worked out for few and cloning work initiated for some of the lead products

ENZYMES FOR (LIME FREE) REMOVAL OF FLESH

- 5 lead samples (lipases) short listed
- Up scaling trials for five of the lead enzyme products have been initiated.(2-22.5 liter batches have been worked out)
- A protocol has been developed for ensuring the laboratory scale performance assay in the upscaled product.
- One of the lipases selected is already a cloned product.
- Degreasing using lipases

FIBER OPENING THROUGH THE USE OF ENZYMES

- Replacement of osmotic processes using lime for fiber opening using Alpha-amylases has been worked out already by CLRI.
- Pure samples of alpha-amylase have been gainfully employed.
- Some commercially interesting leads have been gained.
- Screening of alpha amylases developed by the network for fiber opening applications has been initiated.

SCOPE FOR COLLABORATION WITH USER INDUSTRIES

Total of 18 interesting leads for enzyme only processing have been gained. They are available for further customization of the needs of the specific user and follow-up on partnership basis.

LEADS FOR FURTHER CONSOLIDATION

- Ambient preservation of skin at room temperature without the use of salt is technically feasible.
- Enzyme only processing of hides and skins in the removal of hair, flesh, natural fat and opening of fibers with out the use of lime, sulfide or other beam house chemicals seems viable and technically feasible.
- Total of 18 lead enzyme samples for various applications have been recognized.
- Direct conversion of sulfate into sulfur through microbial processes has been realized.

IMPLICATIONS OF THE BIO-PROCESSING METHOD ON TDS AND SOLID WASTE CONTROL

TDS Reduction at source

Direct avoidance of salt : 245 Kg/T (~55%)

Indirect by avoiding salt formation : 70Kg/T (~17%)

Solid Waste Reduction (Utilization)

Flesh : 250-300 Kg/T

Hair : 40- 50 Kg/T

Trimming : 80-120 Kg/T

CETP sludge : 120-150 Kg/T

ON THE WHOLE

Shift from chemical to bio processing in the beam house of tanneries seems feasible. For the first time, there has opened up a possibility for technologically achieving 2100 mg/L TDS and 100 Kg/T solid waste norms.

ALFA SEMINAR CLIPS FROM VELLORE



ALFA SEMINAR CLIPS FROM PTIET CHENNAI



**TARGETING 5% INDIAN LEATHER GLOBAL TRADE IN 2010 BY
ENVIRONMENTAL MANAGEMENT
ESSAY AWARD PAPER**

P GOMATHEESWARAN AND A PRAKASH

B.TECH LEATHER TECHNOLOGY (2006) AC COLLEGE OF TECHNOLOGY

INTRODUCTION

In the Indian manufacturing sector, leather is one of the most seriously hit sectors among exports. The share of leather exports in total exports was growing at an average rate of 4.3 percent in the period 1985- 1990, but after 1990 share of leather exports experienced a negative growth rate. This could be due to stringent standards imposed by the developed countries.

India's leather industry occupies a prominent role in international trade, generating foreign exchange and providing employment. The industry, which employs more than 2.5 million people, exported about Rs. 10,286 crores in 2004-05. Today, the industry ranks eighth in export trade in terms of foreign exchange earnings of the country with a share of 2.10 percent in global leather trade.

Environmental requirements need to be addressed with a sense of urgency by the Indian Government and industry. Aid agencies, bilateral and multilateral mechanisms also have a significant role to play. Clearly, environmental factors play an important role in India's effort to achieve rapid and sustained export growth. The way forward could be identification of sector specific examples of environmental requirements impacting export performance.

ENVIRONMENTAL REASONS FOR TRADE BARRIERS

Developing countries are more vulnerable to the adverse effects of environmental measures on market access and competitiveness. Various reasons have been identified:

Lack of infrastructure) and monitoring facilities, limited technology choices, inadequate access to (and relatively more expensive) environmentally friendly raw materials

Small and medium enterprises (SMEs) face more formidable compliance costs and there is an increasing emergence of environmental standards of export interest to them.

Developing country enterprises lack the skill and technology required for exploiting the positive trading opportunities generated by environmental measures. They also lack timely and precise information about emerging environmental standards in export markets.

While developed markets are more amenable to harmonization efforts, developing countries have widely differing environmental standards in accordance with their national priorities, rendering harmonization both difficult and inadvisable as compared to mutual recognition and equivalence.

Environmental requirements cover a broad spectrum and include, inter alia, charges and taxes for environmental purposes, requirements relating to products including standards and technical regulations, eco-labeling, packaging and recycling requirements for achieving environmental objectives. Such requirements have significant effects on market access of developing countries like India to surmount trade barriers. These effects would be positive or negative.

International cooperation is required between developed and developing countries which plays an important role in adjusting to environmental requirements.

PARAMETERS FOR IMPROVING LEATHER TRADE

ECO-LABELING

In addition to mandatory environmental requirements, voluntary measures affecting market access of Indian products is eco-labeling. By practicing cleaner process technology, we can acquire eco-labeling.

SECTORS TO BE MONITORED

First and foremost sector is availability of information. Information relating to environmental requirements abroad and available means of meeting them is of paramount importance. This will also involve transparency of requirements, including effective participation in their design and implementation.

Second, positive measures like capacity building, technology transfer and technical assistance could be strengthened nationally, bilaterally and multilaterally. Costs of compliance for SME, need special consideration including collective initiatives for cost effective solutions.

Third, infrastructural investment required to mitigate pressing environmental problems could result in a double benefit — capacity building from development point of view as well as broad-based environmental protection measures resulting in better access to developed markets. A study of areas where price and other premiums are more likely to accrue could help in better focusing infrastructural investments.

KEY RECOMMENDATIONS

Strengthen the existing regulatory framework to ensure better compliance on the part of the polluting tanneries which do not meet the environmental standards mandated by the Pollution Control Boards- This may act as an important tool for compelling the producers to adopt newer more efficient technology and cleaner production methods, ultimately resulting in an environmentally preferable product with reduced environmental pollution and adverse health impacts.

Enhance/rectify the image of India's leather industry in the importing countries and international community. Every country and industry has its own strengths and weaknesses; Indian leather industry should publicize its reputation and environmental performance vis-à-vis other competitors, which would serve as an important tool gaining a comparative advantage in the market.

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Conduct extensive market research on consumer behavior in target export markets including willingness to pay to enable a more comprehensive understanding of environmentally preferable products (EPP) opportunities

Initiate and develop a firm relationship between exporters and importers of leather. Importing countries can play a major role in product development. They are keen to assist the exporters in undertaking the R&D and product upgradation schemes.

Form an Inter-Ministerial Committee to phase and monitor the environmentally sound development of the leather export industry

Establish a National Cleaner Production Research and Development Centre for leather with the strong support of the Indo-German Chamber of Commerce, as Germany is one of the leading export markets for Indian leather

Adopt a national approach to attain a near-zero environmental risk status within the next five years

Reduction of import duties on eco friendly chemicals may encourage developing country enterprises to afford them and perform cleaner processes

Tanners who opt for cleaner processing technologies may be offered tax concession. Also they may be charged less by CETPs.

MINIMIZING PRODUCTION COST

WATER RESOURCE MANAGEMENT

The higher consumption of water is one of the problems, which is faced not only by Indian tanneries but across the world. This will raise the demand of water and its price, which directly reflects in leather cost.

Recycling of water in applicable areas, proper utilization of treated water could be a solution to this problem.

TECHNOLOGICAL ASPECTS

Modern technologies for small tanneries can only be economically feasible if the initial capital cost can be partially borne by government subsidies or grants from donor agencies. Technologies, which can be shared among a number of small units (e.g. Central Effluent Treatment Plants or CETPs) may be more cost-effective.

MEMBRANE TECHNOLOGY

Only Tamil Nadu is adhering to environmental norms of a total dissolved solid of 2100 ppm of industrial wastewater in the entire country. Elsewhere, tanneries dilute wastewater with domestic sewage and throw it in the open. 2100 ppm is an achievable mark if we use membrane technology. The technology is expected to hit the market in the next three years and meet not only environment norms but also make economic sense. Under the new methodology, hides and skins will be preserved at an ambient temperature and pressure without drying or

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salting. This technology has wide range of applications in leather sector and is cost effective also. The technologies include: Micro filtration: Used In bacterial removal, biomass separations, pigment removal, metal precipitation and waste water clarification; Ultra filtration: Used for treating tannery effluent, oil and water emulsion, protein enzyme separation; Nano filtration: desalination, water softening and color and dye removal; Reverse Osmosis: desalination of waste water, chemical concentration of recycling and pesticide, organic and color removal. The benefits include

- Achieve discharge consent.
- Reduce process cost by recycling water
- Reduce process cost by recycling spent liquors
- Recovery of exhausted vegetable tan liquor by Nano filtration and water which can be used for tanning, washing

POLLUTION CONTROL EQUIPMENT FOR TANNING INDUSTRIES

Membrane process, Reverse Osmosis plants are used for controlling water and liquid pollution. This is a cost effective route yet requires skilled labor. Bioreactors are aerobic reactors for biodegradation of organic pollutants in waste water.

Electro dialysis is an improved version of Reverse Osmosis process which involves transferring of ions from the waste water being desalted through cation and anion specific membranes. But this method is expensive.

Energy efficient diffusers/aerators are used in secondary or tertiary treatment process. These reduce cost component in CETP's.

Press filters are used variably in equalization tank of many CETP'S to pump high moisture sludge. It is more efficient than conventional pumps

CLEANER PROCESS TECHNOLOGIES

Due to the stringent environmental standards proposal of developed countries, the developing countries should abide the laws to survive in the global trade. For that, cleaner processing should be adopted in every tannery. Brief outline of some cleaner processing are given below

Manual or mechanical desalting prior to soaking

Counter current recycling of soak liquors

Lime free beam house operations

Enzyme assisted less sulfide unhairing

Recycling of lime liquor washing

Ammonia free deliming process

Saltless pickling

Pickle free Cr tanning

Closed loop pickle Chrome recycling methods involving high exhaust Cr tanning

Less Chrome and Chrome free tanning methods

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Use of eco-benign post tanning auxiliaries

Optimization of float volume in processing

HCHO free finishing technique

Use of newer finishing application system, for instance, roller coater to improve transfer efficiencies

CONCLUSION

With increasing awareness of environmental issues, the leather processing industry must address the concerns of environmentalists and consumers. The transfer of technology and training to developing country producers is beneficial. An eco-labeling scheme may have a role in raising standards by providing consumers with information about particular product attributes. Eco friendly and cost effective way of leather processing can improve Indian global leather trade. Hence by environmental management the share of India in global trade can reach 5% by 2010.

DOWN MEMORY LANE: DIAMOND JUBILEE TECHNICAL LECTURE

MS. REKHA SHETTY ON MIND POWER TO PROFIT: 17.9.05



EFFECTIVE TECHNOLOGICAL APPROACH TO INCREASE THE SHARE OF INDIAN GLOBAL LEATHER TRADE FROM 2.1 TO 5%

ESSAY AWARD PAPER

R SUJIESH KUMAR AND B SAMUEL EBENEZER

B.TECH LEATHER TECHNOLOGY (2006) AC COLLEGE OF TECHNOLOGY

INTRODUCTION

The Indian leather industry which has the eighth position in the total share of global leather production has an annual growth of 0.4% in global sector, whereas China is in the first place growing tremendously. Though, our resources being the most powerful in the world, we are not able to achieve tremendous growth in the leather sector. This paper mainly deals with the improvement of leather trade from 2.1% to 5% by 2010 by application and innovation of new technical advances.

PROBLEMS FACED BY INDIAN LEATHER SECTOR

The leather industry of India is mainly considered as a job work in a small scale without any advanced technologies being created and implemented. For example, the drums which promote the rate of the reaction by means of agitation have come to our sector only after 20 years of the successful application in the foreign countries. Thus, it is in the technological area where an Indian exporter or industrialist is lacking behind the other competitors. Till 1990 under the protection of the Indian government the leather industry had a cool survival, but due to the implementation of WTO (World Trade Organization), the market is open for world competition. At this point the trader who has mass production and keeping up the fine quality with creative designs is able to survive

Moreover the leather industry is considered as a dirty industry in the vision of the society which restricts the common man to make investment in the leather industry.

PRODUCTION TECHNOLOGIES

The process of producing leather mainly is an art work combined with science and technology. The art process comes under design and development of products. The technology deals with the production of products with fine quality and newer ways of producing leather at low cost in optimum time. Let us see in the coming passage how improvement of technology will save money and man power.

Flaying: Our present system of obtaining skins/hides is mainly from small scale slaughter houses and butchers where there are defects due to improper flaying and handling.

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Solution: Innovation of technologies in setting up of large abattoirs where the flaying is done by machines having a proper removal of skin without flay-cut. Also the manufacturers become large stockists for green hides which can be sent directly to the tannery for green processing. This will enhance the production of high quality leather with minimization of TDS in the tannery effluent. This will improve both the trade and resource base of leather.

Curing: The traditional curing of hides/skins by common salt accounts to about 96% in India. This alone contributes to 50% of TDS of the total tannery effluent. A technical break-through in traditional curing can be done by replacing the common salt by various other preservatives. A mixture of magnesium oxide, magnesium oxide, sodium carbonate, methylene-bis-thiocyanate and salt (10%) can be used for replacing salt in the traditional curing method.

Green fleshing: The raw hides and skins are mostly fleshed after liming. This plays a major role in need of more chemicals for liming for the waste materials which is going to be removed in the proceeding step.

Solution: The hide after soaking is taken for green fleshing which helps in removal of wastes and directly decreases the amount of chemicals used and decreases the surface areas. Thus the production goes up along with decrease in chemical cost and time of processing. This helps the trader to compete in the global market with high quality and scale of production.

Lime splitting: This is an important technology which is not popularly followed in the Indian leather industry. This can be a very useful technology that followed in the high technologies nation the main advantage of this is that due to the splitting of the pelt the amount of chemicals used drastically reduces and so the cost as well the amount of absorption is more due to the removal of the unwanted parts and the more surface area created. This also improves the trade because the buyer has the advantage of doing only shaving during the further process. Thus a lot of time will be saved in the processing of leather and a huge sum of money can be saved. Thus the traders can compete in the global trade by reducing the price which is gained here. Also the amount of chemicals used is reduced and the effluent released is also reduced.

Pickle-less tanning: This is the upcoming technology which is developed at CLRI as a remedy to remove the amount of salt in the pickling and thus reduce the TDS. This technology also has a number of advantages like very low time of processing, reduction in chemicals usage thereby reducing the cost of production and increase in profit which can be used for the infrastructure development. Also it is eco-friendly due to reduction of pollution than the conventional processing.

Combined post-tanning: This is an area where the research for combined post tanning should be made. Like a single chemical can be used for both retanning and fat liquoring or retanning and dyeing so that the processing time reduces and cost of spending for two chemicals is reduced to one chemical. Thus a large sum of money can be saved and utilized for the competitive purpose.

Machineries: in any processing industry machines play an important role of producing the product. In leather industry also numerous numbers of machineries is used for better quality of

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leathers. The main aspect of using the machine is to have a large scale of production and up keeping the quality of the leather.

Thus there must be a technological improvement in the development and application of new modern machineries in the leather sector. Let us see some of the machines which likely improve the quality of the leather using optimum time and low cost production, which is not popularly used in the leather industries.

CLaRI processor: This is a new innovation of CLRI, which is similar to a drum used in leather industries but more efficient. The amount of power used for processing is very low than the normal drum and the same diameter of the drum can process more hides/skin compared to same diameter of the normal drum. The oscillation combined with rotation of the drum makes in better agitation. Thus it reduces the overall timing of the processes. The floor area, foundation cost, water utilization, chemical input, energy consumption, and effluent quantity are all very low when compared to the conventional drums.

Desalting machines: In the day-to-day process the removal of salt in solid form has a better advantage of reusing the salt and not increasing the dissolved solids in the effluent. There are methods for removing salt but the efficient method in terms of time and processing ability is the usage of drums with perforations at the surface which enables to a removal of salt in a solid form. Thus it saves time and also the excess of human energy required for the removal of salt. Though there are some disadvantages in the machine but altogether it is a useful technology which can be sorted out with the help of improved versions. The cost of the production in mass is reduced and then the time taken is reduced.

Through Feed Buffing Machine: This machine is very useful for the company's which like to have more scale of production at reduced cost and time. In this machine when the leather is sent in, it is completely buffed, dedusted and comes out within minutes. Thus this machine performing the combined operation of buffing along with dedusting reduces the time involved in the traditional buffing and dedusting machines separately. Also here the labor involved in the processing is very much reduced. Also the level of production is very high in this machine.

Roller Coating: It is a new technology of upgradation of leather in finishing. It is an eco friendly processing since there is less emission of volatile organic solvent in this process. By using this technology very low grade leather with defects can be converted into high grade leather. It has a number of production advantages such as variation of finish applied, low amount of solvent, easy transport and maintenance, less energy consumption, it also has the efficiency of having large scale production and less time consuming. This increases the economic value of the leather and hence the overall production of the leather.

Newer Finishing Techniques: The upcoming technologies such as screen printing, block printing, powder coating, foam finishing should be finely developed in order to upgrade the leathers for better economic value of the leather. Thus it will increase the per-capita value of the leather by increasing the profit.

Need for Cleaner processing: The world is shifted from an industrial development to a safe development which actually means the people are more concerned about the welfare of the future generation. So in many parts of the world the need for environmental protection voices are arising. The leather is at the foremost position gaining major attention of the

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environmentalists. So it is necessary and mandatory for the leather industry to have a very clean and eco friendly production in order to survive in the near future. So many technologies have been evolved and practiced in the leather industry yet a 100% eco friendly method is unachievable. The upcoming technologies throw a light on the industry to reduce the pollution generated in the industry to an optimum level.

Cleaner Process Technologies: Due to the stringent environmental standards proposal of developed countries, the developing countries should abide the laws to survive in the global trade. For that, cleaner processing should be adopted in every tamnely. Brief outline of some cleaner processing are given below.

- Manual or mechanical desalting prior to soaking
- Counter current recycling of soak liquors
- Lime free beam house operations
- Enzyme assisted less sulfide unhairing
- Recycling of lime liquor washing
- Ammonia free Deliming process
- Salt less pickling
- Pickle free Cr tanning
- Closed loop pickle Chrome recycling methods involving high exhaust Cr tanning
- Less Chrome and Chrome free tanning methods
- Use of eco-benign post tanning auxiliaries
- Optimization of float volume in processing
- HCHO free finishing technique
- Use of newer finishing application system, for instance, roller coater to improve transfer efficiencies.

Zero Discharge: It is a new technology which aims at water conservation, no waste water and hence no treatment, compliances to discharge standards, and a chemical (input) reduction. Zero discharge strategies can be grouped under water optimization, reuse and recycling. The advantages include a) water reduction by 89% (Rs 800/day), b) chemical reduction by a minimum of 20% (Rs 500/day), c) no wastewater, hence no treatment cost, d) compliance to all discharge standards.

CONCLUSION

Thus from this paper we try to have a dream of new and efficient technologies that can improve the quality and reducing the cost of production. Thus the traders can have an advantage of competing in the market. Our aim should not be ending with 5% of global trade, rather the sky should be the limit and India should have dominance in the worldwide leather sector.

**GLOBALISED MANAGEMENT SPECTRUM BY GREEN
ENVIRONMENTALISM
ESSAY AWARD PAPER**

**PRABAL GOSWAMI AND RIKTA SARKAR, 4TH YEAR LEATHER TECHNOLOGY
COLLEGE OF LEATHER TECHNOLOGY, KOLKATA**

INTRODUCTION

Leather is one of the world's most widely traded commodities. The trade in leather and leather products — presently worth more than US\$ 60 billion per year which is predicted to grow.

Government of India as a part of the Tenth Plan activity for Indian leather sector has a special programme to benchmark select production units in each segment of leather industry against the global best practices in manufacturing and marketing. The project aims at global standards with reference to both systems and people productivity, improved quality consistency and unit value realization at global best.

Studies indicate that about 30 units in India command about 40% of exports in each product segment of Indian leather industry.

Leather trade in global trade has become a critical factor in emerging market economy. Global competitiveness demands matching of value of products with money and matching service support.

Best practices in manufacture include strategic sourcing of raw materials, processing, environmental safeguards and compliance to social audit norms on the one hand and productivity, cost effectiveness, quality, reducing cycle time and other parameters on the other.

IMPORTANCE OF INDUSTRIALIZATION IN INDIA

Industrialization is the central dynamic force for most countries. It has been a key growth objective of India's planned economy, with heavy investments being made in this sector. Labour productivity is highest in manufacturing industries; this has assisted in raising national income at a faster pace. It is a precondition for agricultural development and it induces development in other sectors (Tiwarly & Singh, 1990). The importance of industrialization in economic development is crucial for a growing economy with a large population like in India, so prosperity through industrialization has been a long-term strategy for the Indian government. Communities, businesses, and governments have debated the results of industrialization, a debate that has continued to grow unabated. Being reliant on agriculture and having a large population base has made India impoverished and hence industrialization is roughly a synonym for economic development as a means to conquer poverty and provide employment.

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India's increasing population crossed the 1 billion mark in May 2000 (Vedantam, 2000) placing an additional burden on the Indian environment. The contrast between India's successful economic development and rapidly deteriorating environments, particularly urban-industrial environments, makes this country a test for the sustainable vision.

India's focus on growth witnessed two problems. One is population and the other industrialization. India realized that in order to become more self-reliant and increase economic growth some changes had to be made. During the 1980s India moved away from its planned market, emphasizing industry growth. Its economy grew at about 5.5% annually. Prior to those years there was a 3.5% growth and recently it has been about 6%, although 8—9% growth is required for the 10 million new jobs needed each year (United States-Asia Environmental Partnership [US-AEP], 1996).

Industrialization enables India to utilize its resources optimally, diversify the economic base, raise the living standard of people, and attain balanced regional development through fiscal incentives and financial subsidy for backward regions. At the same time industries contribute significantly to pollution. Small industries have contributed significantly in the area of urban as well as rural establishments. Raising concerns on environmental grounds are seen not so much as a problem with large industries, as they are more supportive of environmentally protective issues, but more so in the case of small industries. These small industries seem to have acute environmental problems.

ROLE AND PROBLEMS OF SMALL UNITS IN INDIA

As industrialization gathered momentum so did increase in growth rates of small-scale industries. Small units play an important role in the Indian economy, as they are labour intensive and create job opportunities. Small companies are defined as those with less than US \$180,000 in capital equipment (US-AEP, 1996). They offer a higher productivity of capital than big capital-intensive enterprises, as they have low investment per worker. They help in dispersal of industries, rural development, and the decentralization of economic power. All this is required to increase and disperse economic growth.

In addition, small companies support entrepreneurial talent and skills, stimulate personal savings, and help in developing innovative and appropriate indigenous technology, providing dynamism and contributing to competition (Rajendran, 1989). Therefore these industries are supported by the government and have been actively encouraged; no public or private enterprise with more than 100 employees has been allowed to go out of business (US-AEP, 1996). Several policy initiatives and procedural simplifications have been undertaken by the government to support this sector, not only for employment generation but also to enhance their competitive strength. The government has also provided measures such as greater infra-structural support, more and easier availability of credit, lower rates of duty, technology up-gradation, assistance to build entrepreneurial talent, facilities for quality improvement, and export incentives (Parthasarathy, 1996).

Contributions of small-scale industries (SSIs) to India's industrial production, exports, and employment are significant. About 3 million SSI units employing nearly 16.7 million persons

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account for 35% of India's total exports and about 40% of industrial manufacture (SIDBI report on small scale industries sector, 1999, 1999, p. 6). In real terms, the small-scale sector recorded a growth rate of 10.1% in 1994-95 as against 7.1% in 1993-94 and 5.6% in 1992-93. By the year 2025, if not controlled, this sector will grow even more rapidly (Parthasarathy, 1996).

The Government's prime role has been to encourage growth of these industries, often neglecting environmental considerations. Industrial effluent largely comes from the 3 million small- and medium-sized units that are scattered throughout the country, particularly in the production of paper, sugar, leather, and chemicals. Unfortunately, only about half of the medium- to large-scale industries have partial or complete effluent treatment plant. Fourfold industrial growth from 1963 to 1991 resulted in six fold growth in toxic releases. Heavy industries like iron and steel producers contribute nearly 70% of the toxic wastes released but only 20% of industrial output. Industrial disposal of polluted effluent occurs via open drains into streams and reservoirs or through underground injection. Most industrial estates lack wastewater treatment systems (US-AEP, 1996).

Besides pollution problems, small-scale industries also have other kinds of problems. One is internal, that is, the techno-managerial and financial problems that they encounter, and the other is the external problems that they confront due to non-compliance with regulatory and legislative measures.

TECHNO-MANAGERIAL AND FINANCIAL PROBLEMS

Small industries by comparison with large industries lack environmental commitment, technical expertise in environmental management, and the financial capabilities to address environmental problems. Nor do they have standards or effective treatment opportunities and services (Nyati, 1988). Interestingly, one would imagine that because small industries are heavily supported by the Government, availability of finance and obtaining finance for pollution control measures should not be a problem.

Small industries also lack additional space for pollution control facilities. There are difficulties in obtaining the technical assistance of knowledgeable consultants. Since most of the units are dispersed, they find it difficult to come together for a joint or common treatment plant. The concern of depressed profit margins and decline in competitiveness prevents these units from using pollution control measures. More emphasis is laid on new investments, production, and other return oriented opportunities. Soft loans for pollution control measures are not lucrative. There are subsidies offered for investments in pollution control as incentives, but the impact of these incentives on these units is little or nothing, for they do not alter the cost-benefit analysis in favour of pollution control investments (Nyati, 1988).

REGULATORY PROBLEMS

Research done by Pargal, Mani, and Huq (1997) on industrial plants in India, indicated that high levels of pollution elicit a formal regulatory response in the form of inspections, but these inspections appear to have no impact on the emissions. Inspections are probably ineffective in bringing about desired changes in behaviour because of bureaucratic or other problems, including the probability that enforcement is low and that the penalty for non-compliance is not stringent enough to act as a deterrent. They suggest that Indian policy makers and regulators thus need to explicitly recognize the trade-off in environmental quality of the existing regulatory bias towards the small- and medium- scale sector.

Regulatory compliance has been a major issue for these units. Environmental legislation in India, although seemingly as tough as that in major developed nations, is not well enforced. Though multinationals and the large domestic companies are monitored, poorly funded regulatory bodies find it nearly impossible to police the millions of small- and medium-scale units. Bribing poorly paid inspectors is reported to be common (Roberts, 1995).

Environmentalists have viewed enforcement as lax, despite the regulatory framework and oversight authority of the Central and State Boards. There have been no incentives to invest in the pollution control effort because of weak monitoring and enforcement of environmental regulations. It is mainly small industries that continue to lack incentives to set up treatment equipment or to operate equipment, if it already installed, because operating that equipment has been more expensive than non-compliance (Dasgupta, Laplante, & Mamingi, 1998). Obviously, in India, scarcity of natural resources is less a concern than misuse of them. The pressure for profits predominates. Porter and Linde's (1995) suggestion that environmental regulations can spur innovations that increase product value and decrease total costs seem appropriate. The trade-off between economy and environment for production processes, customer needs, and technology is dynamic and complex. Porter and Linde suggest that innovation-friendly regulations can improve resource productivity and competitiveness, but the problem is getting small industries to co-operate and to view it as a long-term solution rather than a short-term goal.

ENVIRONMENTAL REGULATIONS

India began to develop distinctive forms of environmental laws and regulations in the 1970s. The first of India's modern environmental laws was the Water (Prevention and Control of Pollution) Act of 1974, which established the Central and State Water Pollution Control Boards; the Water Cess Act of 1977; the Air (Prevention and Control of Pollution) Act of 1981; and the Environment (Protection) Act of 1986. The latter is umbrella legislation designed to provide a framework for central government. The problem envisaged here is not insufficient laws or pollution control boards that can control pollution but, as the World Bank has stated, that these boards have been plagued "by poor enforcement due to political interference. . . whereas as with other enforcement activities in India, corruption is pervasive" (US-AEP, 1996).

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Another point worth noting is that the mandate of the Central Pollution Control Board (CPCB) is to set environmental standards for all plants in India, lay down ambient standards, and coordinate the activities of the State Pollution Control Boards (SPCBs). Unfortunately, the implementation of environmental laws and their enforcement are decentralized and so is the responsibility of the SPCBs (Mani, Pargal, & Huq, 1996). This is another haphazard method of addressing the issue.

In addition, pollution laws have achieved little success. The courts have been slow to respond to enforcement actions sought by state pollution boards. The boards themselves have been poorly funded and charges of corruption have been regular and widespread. Large industries have achieved pollution compliance more easily than small industries (US-AEP, 1996). The reason is that they are afraid of taking risks. Lau and Srinivasan's (1997) research on identifying the driving force for better environmental performance found results that implied the current effort in environmental management is driven largely by a fear of the penalty that can be imposed by the government when environmental laws are violated. However, Cornell and Shapiro (1987) explained that a firm's value depended on the cost of explicit and implicit environmental claims. Explicit claims of the shareholders can be recognized, but the implicit claims of the firm cannot be ignored. If the firms refuse to comply with its social responsibility and quality service, parties to implicit contracts, like consumers or regulatory agencies, can force burdensome explicit contracts on the firm. Cornell and Shapiro's explanation applies widely to large industries, but in the case of small firms it is apparent from the literature above that this can be totally dismissed by resorting to other means.

POPULATION VERSUS ENVIRONMENTALISM

Lastly, population issues are a major growing problem in India. To sustain this growth, economic development and industrialization are the compounding factors that are an environmental burden. An approach first used by Ehrlich and Ehrlich (1990, pp. 132- 134) was to consider per capita environmental impacts on citizens. Their notion of the realization that we live in a finite world in which euphoric economic growth and population expansion would eventually exhaust the natural resources was not met without controversy. Stikker (1992) further expanded Ehrlich and Ehrlich's approach and defined the environmental burden as:

Global environmental burden = global population x GNP per capita x Environmental impact per unit of GNP

If one considers population, GNP, and environmental impact per unit of GNP, India, with an annual population growth of 1.91%, increases every year by the size of the population of some countries in Europe. India's population doubled in the last 30 years and is expected to surpass China's population early in the 21st century (US-AEP, 1996). On an individualistic approach, if one considers individual country populations, India and China would be the countries with the highest burden. What Stikker, and Ehrlich and Ehrlich suggest is that if industry is to operate within a level of global environmental quality that is not deteriorating, it must reduce its global environmental impact. Peattie's (1995, pp. 1-15) suggestion regarding the concern generated by

the Ehrlich and Stikker concentrated on the issues of shortages of economically important resource inputs. The problems that emerged in the 1980s were not concerned with the inputs but dealt more with the environmental impact of the outputs due to indiscriminate economic growth.

Resources will be required to sustain population growth, as well as the outputs of industrialization and economic growth. Said (1997) provides two logical solutions to the Ehrlich's theory, one is that humanity should breed less and the other is that we should consume less and produce lower environmental impacts in the process. Changing lifestyle and consumption habits in the long run will be effective but will not directly address environmental impact unless industries themselves take the stance and priority of protecting the environment and measures are enforced to curb population growth.

ENVIRONMENTAL AND SOCIAL MANAGEMENT

The Leather industry commodity chain will need to apply acceptable environmental and social strategies and programme. Their participants will be required to develop and apply benchmarking, social mapping of labour conditions and practices prevailing in factories and workshops around the world in order to comply with the expected demands from society concerning pollution prevention, safe use of chemicals and working conditions. Industry associations and industrial development support institutions should undertake this work.

CONCLUSIONS AND DISCUSSIONS

The major environmental concerns in India today are due to poverty, coupled with growing population and the side effects of enhanced industrial activities. As long as poverty remains the main stumbling block, industrialization provides hope of significantly improving the standard of living. One of the measures most talked about that might gain recognition within these industries is sustainable development. Removal of poverty and environmental protection are two sides of the same coin that is sustainable development (Dwivedi & Khator, 1995), but policy makers, governments, politicians, and industrialists have challenged many of the underlying values and assumptions of sustainability. Sustainability or sustainable development can also be described as development or progress that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Although, industrialization is seen as a solution to providing economic growth and increasing employment levels, irrespectively, industries, whether large or small, low- tech or hi-tech, manufacturing or agricultural, all inevitably produce discharges and wastes those are capable of polluting. Where high population and economic growth demands resources (inputs) and discharges (outputs) in the form of pollutants, not many industries have arrived at suitable suggestions on sustainable measures, thus putting pressure on the environment. Hart (1997), in fact, recognized the problem of a growing population, rapid economic development in emerging economies, and political and social issues that exceed the mandate and the capabilities of any corporation. However, the suggestion that learning to balance ecological principles, economic

growth, and social responsibility be priorities of businesses (Johannson, 1994) does eventually make more sense. Sustainable development challenges industry to produce high levels of output while using lower levels of inputs and generating fewer wastes with a more effective use of raw materials in production that would eventually result in diminishing costs. This greener corporate image could then lead to an increased market share (Welford & Bhargava, 1996). Hart (1997) states that the business logic for greening has been largely operational or technical, and bottom up pollution prevention programs have saved billions of dollars, but few have realized that environmental opportunities might actually become a major source of revenue growth. The suggestion made by Hart, and the concept of sustainable development should, in fact, be made the core objective within the operations of small industries.

Small industries could also go one step further in addressing a sustainable vision i.e. a trade-off between economic growth, profitability, and sustainable environment. Within industries, management should be charged with the responsibility of implementing this concept of the sustainable vision into action by firms. One such measure is Johannson's (1994) trisect of sustainable business. It is founded on the concept of balancing ecology, economic, and social factors that are included in the industry's value system, and included in the business planning or design phase resulting in profits through ecologically sound products, processes, or services. In a complex relationship between population, economy, industry, and ecology, managing the environmental responsibility is a prime issue in India. Population will always be a problem if not properly curtailed, but in the case of industrialization there is a growing need for a sustainable vision where industries are made responsible for their acts. With today's current technology and strategic management systems, industries can be effective in reducing the gravity of environmental impacts. The green challenge is an issue that is relevant to every industry big or small. Every business faces pressure to improve its eco-performance.

As regards regulatory pressure and compliance, many businesses spend more time in fighting regulations and take a less proactive, strategic approach to environmental management (Schoemaker and Schoemaker, 1995). Although Indian Courts closed almost 1,000 factories for pollution problems, and the Supreme Court fined 15 plants, including some multinationals (Shaman, 1996), the effectiveness of these regulatory pressures and compliance has still to be realized. Johannson (1994) addresses a "green firm" as one that does not look at regulatory or legal compliance as a first step. The ability to assure that a firm is "in compliance" is therefore a poor tactic, and very cost- ineffective. Managers who understand environmental laws can be counted on. In other words, regulation, compliance, and environmental laws will take care of themselves if managers adopt a sustainable vision or green objectives for industries. Much of the literature seeks to establish that there is an acute need for regulatory and legal measures. However, pressure for sustainable vision in these small industries lies within themselves. They must realize the importance of environmental management and quality and that it could be highly effective if the small units themselves administer it.

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GENERATING CORE VALUES FOR THE INDIAN LEATHER SECTOR THROUGH MARKETING – A PANORAMIC VIEW

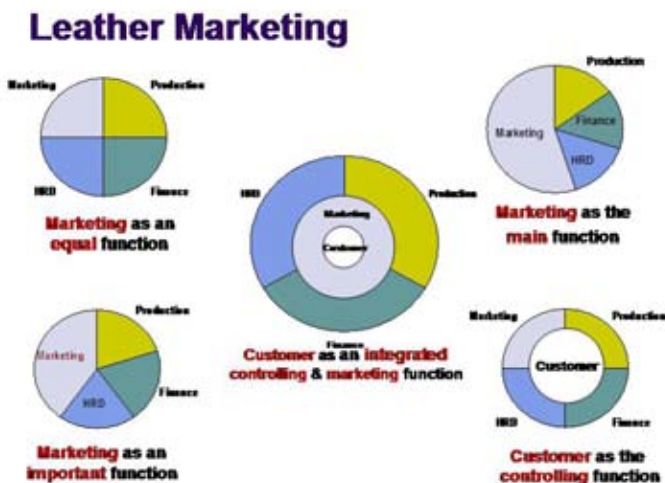
N R JAGANNATHAN
ALFA ORATION: 2005

LEATHER MARKETING

Can we precisely define marketing as it applies to leather, leather garments and products including footwear? Difficult, for it is a complex process involving a number of elements. One can approximate and state that it is an expression of the philosophy of technology, manufacture and behavior among societies based on customer's requirements. It encompasses.

- Marketing as an equal function
- Marketing as a more important function
- Marketing as the main function
- Customer as the controlling function and
- Customer as an integrated controlling and marketing function (see diagram below)

Marketing is well understood generally but in the leather and leather products sector it is not so due to the abnormal, contradictory and unpredictable nature of variables of the markets where the products are presented.



For example if one has to start a tannery or a shoe factory or any leather related plant, it is not the choice of the plant or machinery primarily but it is the product that is to be put out with quality level dictated by the markets where it will be offered. Hence it is essential for an entrepreneur to know the variables in a market, get in the groove, start supplying and stay at the top as a leader learning the

qualities of leadership thereby. Therefore I propose to share with you a few points on recognition of market variables, buyer behavior and organization of leadership qualities. This I do on the basis of my personal experience of over three decades in this field.

GLOBAL MARKETS – CHARACTERISTICS

The global market set up is known. It is not just an international but a transnational setting. Most of us today are not only transnational sellers but also buyers, buying heavy cow leathers, soles, cut units of soles & heels, trims, lining materials, ornaments packing boxes etc.

When we are appearing in the global market stage it is imperative to have maximum knowledge of a) Risks involved in global marketing, b) Product and market behavior through an understanding of the market and its fluctuations, c) Market planning with focus on customer satisfaction and d) The marketing process which includes a) analysis of information systems and research, b) market environment, c) consumer marketing and behavior, d) business markets and buyer behavior, e) industrial market behavior, f) competition analysis, g) forecasting market demands on the basis of (a) above and h) strategies for global marketing

Now let us have a closer look at some of the above, the risks involved in global marketing are based on: a) Fluctuating exchange rates, b) Unstable governments, c) Protectionist barriers, d) Hi-tech costs, e) Inaccessible locations due to lack of transportation, f) Factors dependent on the economic, political, legal and cultural characteristics of countries, g) Competition activities, strengths and weaknesses, and strategies to stand up to competition as demonstrated by different nations.

RIGHT PRODUCT AT RIGHT PLACE - PRODUCT POSITIONING

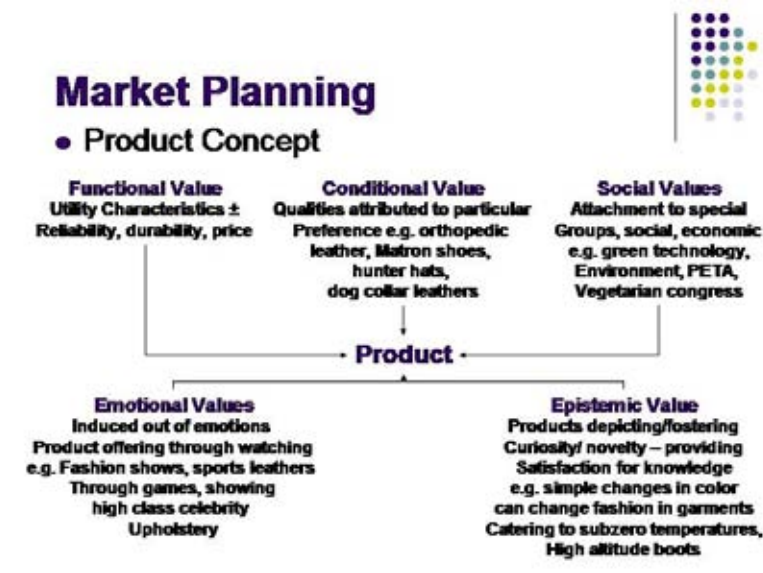
It is vital to know the customers requirement of a product. Take for example if you are offering a pair of shoes, you should know whether it is for summer or winter wear so that the product measures to the expectations of the seasonal buyer in terms of color, comfort, style and other ethnic values. It is illogical to offer a pair of knee type ladies boots in the desert climate of the Middle East in summer or offer an open type sandal to people of Canada during Dec - Jan. This rule is applicable when offering garments and gloves too. This leads us to the next point of understanding the market. The pre requisite here is to know the global environment, global economy, income gaps, organization and society in general. Culture, heritage with the global and national perspectives.

We need to consider this as important because in global marketing the consumer in rich and developed countries like USA, Germany, France, UK and Australia may afford to buy a product whereas the same at such price levels may not be suitable to people in developing countries like India, Pakistan, Indonesia, China or in under developed countries like the East African countries, Bangladesh Vietnam etc.

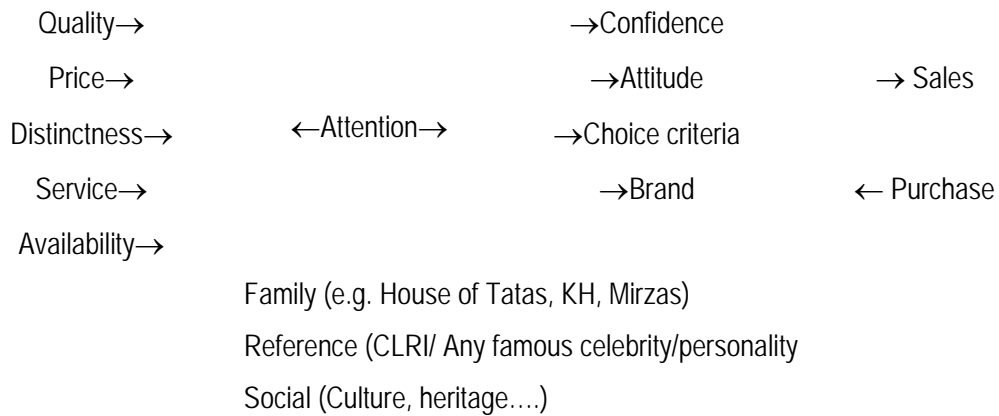
Analyze the customer's satisfaction in terms of needs, wants and demands. Prescribe clearly the service factors like product information, comparison to competitive costs, degree of satisfaction, guarantee, and highlight their bilateral arrangements through value transaction methodology. This means we need to work with near perfect market planning strategies.

Market planning is broadly classified into product concept and selling concepts.

PRODUCT CONCEPT



SELLING CONCEPT



MARKETING CONCEPT

Target place → customer wants → coordinated marketing → profitability thro' customer satisfaction

SELLING CONCEPT

Factory→ products → sales & promotion → profits through sales volume

PRODUCT POSITIONING

Once the above is completed, the marketing process starts and here various factors determine the positioning of a product – may be a pair of shoes, a jacket, luggage or any other sports goods. The marketing process takes us through Product line :: Brands :: Pricing :: Packaging :: Servicing :: Sales Promotion/Sales force :: Market channels (retail, wholesale, physical distribution/direct marketing) :: Marketing programs – Advertising , promotional ventures, brand ambassadorships etc :: Communication/Emotion/Public Relation

It is obvious that the buyer behavior is a function of these measurable and immeasurable variables.

LEADER IN MARKETING

An entrepreneur or a CEO or a technical expert has to understand the marketing of the product that is made. It is not enough or satisfying that he has given something to the market. That is for people who want to be one-time players. But if you like to sustain and continue the growth, you then aspire to be a good leader – not only a good leader but a clear leader. There is something unique about such a leader. It is not merely creativity, courage and integrity. Though these factors are essential, one may still fail to be a good leader. A true and good leader's job is to rally people around to work for a better future. One can not help and change the present but a good leader looks ahead. For good leaders, the future calls in a voice they cannot ignore. , it is real and compels them to act.

SUCCESS OF A CLEAR LEADER

The challenge for a leader is that every society is anxious of the future. The future is uncertain, unknown and perhaps looks potentially dangerous. It is a successful leader who turns the unknown fear to spiritedness. He should be very clear as to define a future in such clear terms and point to where we are heading. It is said that clarity is the antidote to anxiety and hence clarity is the pre occupation of any effective good leader.

I would like here to quote Denny Clements, The General Manager of Toyota Lexus Group “OUR STRENGTHS ARE OUR PEOPLE, OUR CREATIVITY, PRODUCTIVITY AND OUR EFFICIENCY” Always believe in seeing what is happening in other countries than copying without knowing what we are doing and why we are doing. It is lack of clarity. It is the leaders' call to tell the people around as to where we are going, what we are doing and what the obstacles in the process are and how they can be overcome. The clearer the answers to questions, the more confident, more resilient more persistent and more creative will be people under good leadership.

When I was pursuing a course in marketing course in Bombay in 1975-76, as part of the curriculum, we were asked to pick up any 5 or 6 ads from dailies / magazines and comment on them. Out of the picks there was one on SWISS AIR AD which claimed to serve Uppuma on

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flights from Bombay to Zurich. I commented that it was bad and negative in nature and instead of claiming that travel with Swiss Air was safe, the ad talked about Hot Uppuma. Those were the days when only DC8s or Boeing 707s was flying. No High Tech 747s or Air Buses. Swiss Air accepted my comments and quickly modified the ad. Of course they did talk about the food served but the USP was more on the safety of flights.

The moral of the story is "WHEN YOU PROMOTE YOUR PRODUCTS THROUGH ADS YOU HAVE TO BE CLEAR AND SPECIFIC AND CONVEY THE CORRECT MESSAGE"

COMMUNICATION WITH BUYERS – CONFIDENCE BUILDING

Be specific and up to the point. Show your strength accept only what you can do and how much you can do. This is a confidence building measure. If you give futile promises, that cannot be fulfilled, you cut a sorry figure. You are no more trusted or believed. Whenever you are at fault, be it regarding the time of deliveries, quality of the product, or any other problem, accept without fear and you will be accommodated and rewarded. After all you must understand that the buyers are in need of the materials as the sellers do need buyers. Hence this two way traffic of perfect and transparent understanding is very important for a long term and continued business relationship.

My sincere advice to all budding business magnates as well as to those who do exist today - As a manufacturer you know your product and what it costs. When a buyer approaches you with an enquiry, ask him to specify his requirements and then respond. Nine out of ten times, the buyers do come out with all specifications but unfortunately sellers ask the first question "at what price do you want.?" I cannot think of a situation wherein a supplier instead of quoting his price, as per specifications, asks for the buyers' offers. This leads to an unpleasant situation. Does it mean this seller will tailor the product according to the price? Where then is the quality assurance. ?

I do feel that we fail to cash in on our strength. If tannery X is strong in Kid Leathers how can one imagine it can supply quality buffalo / cow / calf. I do accept that process technology is freely available and we are all aware of it. But do you have the infrastructure to produce hides in a skin tannery or ladies shoes in a predominantly gents shoe line or can a wallet / key chain passport holder factory produce large luggage and upholstery. Can a children shoe unit produce knee and ankle boots? No certainly not – we have failed to cash our strength.

Technology Leading to Market Ferment– Nothing of this kind developed but with the evolution of technology and various related factors, the scene has changed and we have now emerged as a strong technology based industry and an acclaimed player in world leather market. But we remained selling leather or products. We did not go in a big way to market the products because marketing needed a totally different approach. Understanding it correctly will bring success. Consumer must be directly brought in contact. If this happens, then I think we will achieve what we talk of viz., capturing 10% of the global market share. I know some tanners out of our Alumni are specializing in certain leathers or on products, sticking to them and becoming high quality producers. This is called product identification and you score high if your identity is a correct one.

STAND BY YOUR PRODUCT

Give your buyer/customer the assurance that you are 'responsible' for your product. Go to Walla mart/K Mart /Marks and Spencer or any other big stores; you will see counters accepting return. This is the business ethics and reassuring the philosophy that customers are masters. Today China is emerging as a volume producer. Perhaps leather used there may be a small percentage, the rest being non leather material. Yet the economy of the product induces the buyer to accept it. Instead of fighting this scene, we must plan our market strategy, Go to a stipulated market, and try to go in for well defined truly leather products. Perhaps we can join hands with leading market players/ leaders in that country and get the maximum market share. Create marketing products, so that in your X no of products at least one could be a block buster and you have the full market under your belt.

FUTURE LEADERSHIP AND OUTLOOK

I just want to draw two illustrations here. :-

CLRI – Started in the 1950s for Research on Technological Improvement on leather reached its peak in three decades and became the leader and an accredited global institute. Had it remained the same way, without futuristic vision, perhaps decaying factors would have crept in. But the successive leaders of CLRI from early 90s to date set their vision on the future and started looking in different directions without sacrificing the basic character of leather research. Our own Alumni in CLRI is representing the Country in Modeurop Board and predicting market needs on colors and materials. Dr T Ramasami, Director of CLRI now is in the center of the orbit of policy makers of Govt. of India, on Leather Industry – indeed a proud record for all of us.

There are Tanners / Footwear Manufacturers / Leather Jacket producers who have gone in for ISO standards. Today very young entrepreneurs have come for TQM concepts and they set their vision beyond it and want to compete for DEMING prize for quality accreditation. Should they succeed, then nothing like that? Again this is leadership at its best.

Sometime around 79-80, in a Tanners get together forum, Dr.Y.Nayudamma remarked that the art of tanning was complicated as operations were done and undone due to the heterogeneous character of the skin / hide.

I felt I should share with you a few ideas based on personal experience. Some may feel that there are other ways of description of the market and may follow a different logic. That is the beauty of the fickle state of the leather markets. But all will agree that whichever way one orders the priorities- dynamic as they appear- the essential components are as discussed till now. That was exactly the purpose of my talk. If at the end of this talk, a stimulus is created, a debate occurs and discussions are preferred, I will have achieved my purpose.

Thank you for the honor conferred on me and thank you for your attention.

ALFA TO ALFA
ALFA TO AUGMENT LEATHER IN FASHION ARENA

MOHAN M SREENIVAS
ALFA ORATION 2006

Good Evening, friends. I consider it a great honor to have been conferred this year's ALFA Orator Award. No matter how far one goes in their life or career, one of the biggest achievements is recognition by their Alma Mater. After all, this college has played such a large role in shaping my ideas and making me who I am today. So I thank you very much for this honor.

When I was asked to choose the topic for the oration, I wanted to talk about the biggest challenge facing the Indian Leather Industry today. A few years ago, all of us would have talked about the effluent problem. I think to a major extent, we have crossed that bridge. Reverse Osmosis plants are being set up individually or collectively, and I hope we will soon come up with a solution for disposal of salt.

So, what is the major challenge today? To answer this question, we first need to look beyond our country's borders. All of us would agree that China is our major competitor. They are investing in huge tanneries and have vast resources both in finance and in labor. They are also quickly making up for their shortcomings. To fill up the gap in Human Resources, they are recruiting both technologists as well as tannery workers from all over the world. They are the major buyers of the raw material today and world prices are kind of dictated by them. On large volume, low to medium price range products it is almost impossible to compete with them. There would be exceptions due to various other factors.

The other major player in the leather industry is Italy. They have always been at the leading edge of both technology and fashion. The majority of the top fashion designers or fashion houses are from Italy and their input has helped the Italian tanning industry to come up with innovative leathers on a continuous basis. As a matter of fact, that is the only way the Italian tanning industry has been able to keep its head above water over the last few years. However, the end is not far in sight. Major design houses have realized that they cannot continue to manufacture leather products in Italy. They are actively looking for new sources.

So, what is the road to excellence? We, in India, have several factors in our favor. We have the world's largest livestock population and fortunately protective measures against export of raw material. (This is a subject some of my friends might not agree with me but that has the makings of a different speech altogether). In terms of technology, we are second to none today. On the fashion front, in Modeurop colors, India accounts for close to 90% of the colors chosen. Therefore, I see it as a natural progression for us to be the next dominant player in the fashion segment of the industry. I strongly believe the potential for growth is the highest in the fashion segment and I will come back to that later.

Diamond Jubilee of Leather Education

Having decided on the topic for today's oration, I had to come up with an apt title for it. I have always been inspired by Dr. Ramasami's acronyms for Leering sessions conducted by CLRI every year. The acronyms have always conveyed a strong message to the industry. Take for instance, the 2005 LERIG session. Called GRIP, Dr. TR's message to the industry was loud and clear: come on guys, get a grip on what you are doing in the leather product sector, otherwise you are going to loose it. Since the subject of my oration is on the role of leather technologists in increasing or augmenting the use of leather in the fashion arena, I came up with the title, AC Tech Leather and Footwear Alumni Association (the crème de la crème of the Indian Leather Technologists) to Augment Leather in Fashion Arena, or shortly ALFA to ALFA.

However, let me share with you my apprehensions about bringing in the word 'Fashion' into today's topic. During the years that I was the Honorary Secretary of the Indian Finished Leather Manufacturers and Exporters Association, I was also the convener of the Leather Fashion Show conducted every year by the industry during the India International Leather Fair at Chennai. In that connection, I had to meet Dr TR for CLRI's participation in the show as well as for financial support. Conducting a fashion show is a lot of hard work but for some reason, a few of my friends in the industry, including Dr TR, focused on the fun of having so many models around. This word association has been hard to shake off, so I was very scared of the wrong connotation the word fashion might bring, but I am sure that Dr. would agree that I have used it for the right reasons.

So, if fashion is not just the glamour of models sashaying down a catwalk, what is it? Fashion is embracing a style, a trend and comfort. To make a fashion product designers have a variety of fabrics with which they can work. In recent years, leather has become the natural choice for designers. Designers make the most of leather's versatility and textures. Advances in technology have made it possible for the leather to be treated and finished in various ways, sometimes to simulate other fabrics.

For shoes, leather is the obvious choice because it has all the characters required for foot comfort. At various times, designers have included some synthetic materials in combination with leather depending upon the fashion requirements but only for a short duration. Fashion trends have also made us come up with leathers, which possess qualities, which were not normally associated with leather. Here, I am talking about the water repellent leathers, washable leathers, etc. Advances in areas like roller coating and turbo vacuum drying has enabled to come up with soft touch and bright optics, previously thought impossible to achieve in leather.

In leather garments, if we have to survive, we should be able to duplicate whatever that is possible in other fabrics. Leather is no more just outerwear and even in outerwear, competition from other fabrics like nylon, polyester and other synthetic materials has eaten into the share of leather. But not to despair. Surveys conducted by leading retail specialty consultants indicate a change in the buying patterns of people. Earlier, people were buying according to seasons. Nowadays, lots of lightweight fabric garments are bought even during wintertime. Designers have started using 0.4 mm fine smooth leathers in autumn/winter garments. The major reason being its silky touch with its inherent leather character. Soft and supple leathers have made such inroads in the apparel market that it is considered as the new silk. Indeed, it shares several qualities with silk. It is a luxurious and desirable material with a unique texture and feel. People

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now consider leather a second skin. Although some leathers are called hides that are the last thing people want to do when they wear a leather garment. It is something to be seen in.

Over the last few years, use of normal suedes and nappas has almost disappeared in the leather garment industry. If the leather does not have a prefix such as washed, wrinkled, centrifuged, or crunched, it is out.

Leather accessories such as belts and bags have become major markets in the last several years. People are willing to spend money on products that make a statement, or more importantly, that add just the right touch to complete an ensemble. Most contemporary trends in leather accessories are short lived. This means they are high volume but are trendy for a very short time. If we miss the window of opportunity on the trend, it is a big deal. To cite a few examples, all of us know how trims on leather goods accentuate the beauty of the product. A major trend today is using leather covered metal buckles and fashion houses are willing to pay very good price for such items. People are willing to pay \$50 to \$100 for belts made with garment suedes with huge buckles.

So, what does this all mean to us, the leather technologists? Footwear accounts for the largest usage of leather. Demand from our domestic market is expected to grow several folds over the next few years as the growth rate of Indian economy is expected to be over 8% in the years to come. Under the WTO regime, as we lower the tariffs on imports, footwear from China and Vietnam would make major inroads in our market. We have seen that happening already in the sports shoe segment.

Competition in the commodity type of leathers like normal upper leathers, suedes and nappa leathers are very high. Leather products made with such leathers have very thin profit margin. These markets are also dominated by major chains like Walmart, Carrefour, Aldi and Target and such big players also prefer to buy from large manufacturers. In India, we do not have many companies who have that kind of capacity. In China, average capacities exceed 50,000 pairs per day. How many shoe factories have such capacity in India? We can never be a major player in the large volume mass market.

We should leverage our strength in technology to position ourselves as the major player in the medium and high price segment of the leather product market. Traditionally, we have been working with Europeans and that has enabled us already to make a significant mark in that segment of the market. Our country's export statistics clearly indicate that the average price of products exported by us is in that category. Our own company's experience has shown that there are significant advantages by concentrating in the medium and higher priced segment of the industry. One of the major advantages is huge reductions in marketing efforts and expenses. Buyers come to know established reliable suppliers from industry sources, and that makes our entry into some of the leading brand name companies that much easier.

Medium and high priced segments are influenced mostly by fashion trends. We have to follow the fashion trends very closely and come up with articles which designers should automatically choose when they put together their collection. As I remarked earlier, CLRI has already made a major impact in the Modeurop fashion colors. They also put together the kind of finishes and textures that are going to be in fashion. The most difficult part is to convert those ideas into

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actual products. People with such knowledge are hard to get. We can get nowhere if we just copy what is being made elsewhere. We need to work closely with institutions like the National Institute of Design, Ahmadabad and National Institute of Fashion Technology, New Delhi in this regard. The initiatives CLRI has taken with NID and the Council for Leather Exports with NIFT have to be pursued vigorously and CLRI has to play a pivotal role in coordinating the work done by these institutions.

A highly significant percentage of the fashion leathers today are made possible because of the advances in finishing systems, mostly in the areas of mechanical operations. Here I mean repetition of mechanical operations. One of the reasons why our leather industry has not grown in spite of us having the best technology and the premier institute in the whole world is, we do not interact actively with other industries. Why with other industries, even amongst ourselves we do not share ideas or resources. (I would like to quote here what an American told me several years ago. "Mohan, if you drive from Ranipet to Ambur, and add up the capacity of the shoe factories in that area, they can supply the requirement of the American market (maybe he was talking from the point of view of the dress /formal shoe market), but you people do not share resources. Not everybody can have all the equipment. If only you could do that, you can have the world").

We have to also work closely with people in other areas, as I see increased use of laser cutting, screen/laser printing, etc. Fashion trends are going to force the textile industry to such levels in technology. I believe we will benefit tremendously if we could create a platform wherein the textile and leather industries can exchange ideas. An analogy, I would like to draw here is the health care industry. I have been amazed with the advances that are taking place constantly in that industry. Here, I am talking about various techniques like radio frequency ablation, several kinds of implantations like the pacemaker, defibrillator, etc. Doctors who diagnose the patients are not directly involved in developing these equipments. Independent research and development companies produce these machines, but they work in close connection with hospitals and doctors. Expenses relating to the health care industry are phenomenal because people's lives are dependent on it. In leather technology as well, we need to develop up to date machinery and techniques that are most relevant and useful to companies today. Working more closely with the textile industry will help give us that edge.

In the product sector, the level of quality we in India are able to achieve or the kind of intricate detailing we can perform is highly appreciated by people in the fashion field as well as in countries like Japan, Korea and Germany. These people acknowledge that China is not capable of manufacturing such quality products. Some of our buyers have informed us that they do not foresee a threat from China in that segment of the market. And those are the segments where price realization is very high.

Having talked about our strengths, we have several areas of weakness. A major weakness is our turn around time in production, more so, in sampling. In spite of our having equipped ourselves with CAD systems, we are far behind China in this area. Companies like Zara and H&M introduce new styles almost every month, and they expect samples to be submitted within a couple of days. Now, that is the benchmark we have to achieve. This is one of the major areas in which we are going to be under constant pressure. The level at which we are able to service

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our customers is going to be one of the major factors that they are going to be taken into consideration when they make purchase decisions. And in today's world, time is of the essence, a factor that doesn't just affect the leather industry, but all walks of life.

For us to succeed in this highly competitive arena, we have to work harder at working together as a unit. Everybody in the organization has to understand the requirements of the market, the cost of falling short of the level of performance, and the benefit accrued by the company if we continue to perform at optimum levels. If we collectively have a vision of the goal we are trying to achieve and understand its methods and purposes, we can increase the motivation within the organization to realize the end result.

Motivation, I believe, is key. After all, it is precisely the object of my own speech to you all today. I do want this to be an opportunity to share information, and for us to take a hard, honest look at our strengths and weaknesses. But, more importantly, it needs to be a call to action. The first step is awareness of the direction in which we need to be headed. But once we have crossed that bridge, the next step is implementation.

I hope my time with you today has helped synergize your own thoughts on the future of the Indian leather industry. So, is there a message I would like to convey from the acronym of today's oration to my fellow alumni. Yes. Alpha, as all of you would know is the first character of the classical Greek alphabet. Having drawn the name of our organization and the title of my own speech from this foremost alphabet means that we have a responsibility. A responsibility to not just be first, or alpha, in name, but also first in our ability to transform thought to action.

Thank you.

DOWN MEMORY LANE: ALFA ORATOR AWARD PRESENTATION



DR T RAMASAMI – 2003



SHRI OK KAUL – 2004



SHRI NR JAGANNATHAN – 2005



SHRI MOHAN M SREENIVAS - 2006

ENZYMATIC REMOVAL OF MELANIN IN ENZYME BASED DEHAIRING AND FIBRE OPENING

V. PUNITHA, P. KANNAN, S. SARAVANABHAVAN, P. THANIKAIVELAN[#], P. SARAVANAN^{\$}, J. RAGHAVA RAO, B. U. NAIR AND T. RAMASAMI

PAPER PRESENTED BY Ms. V PUNITHA, AN ALUMNUS OF AC TECH AT THE EUROCONGRESS DURING MAY 24-27 2006. Ms. PUNITHA RECEIVED A TRAVEL ASSISTANCE FROM ALFA FOR PRESENTING THE WORK AT THE EUROCONGRESS

ABSTRACT

Melanin is a natural pigment of skin and hair, which provides a protective function against sunlight. The non-removal of pigments from the skin gives the finished leather a patchy appearance. As leather industry is undergoing a paradigm shift towards bioprocessing, enzyme based dehairing and fibre opening are becoming ecologically important. However, the enzymatic dehairing and fiber opening of buff calfskins from certain origin results in non-removal of pigments. In this study, an attempt has been made to remove the pigments from buff calfskins using enzymes. The presence of melanin in buff calfskins was identified through UV-visible spectral analysis. Preliminary trials have been carried out with various concentrations of xylanase in enzymatic dehairing and fibre opening. Addition of xylanase provides complete removal of melanin during enzymatic dehairing as well as fiber opening. Semi-technical trials have been performed by employing xylanase during enzymatic dehairing and fiber opening individually. The removal of melanin was found to be 100%. The performance characteristics of the resulted leathers have been analyzed and found satisfactory.

INTRODUCTION

The do-undo methods adopted in conventional leather processing generates huge amount of pollutants, in view of the fact that they subject the skin/hide to wide variations in pH. Pretanning and tanning processes alone contribute to more than 90% of the total pollution generated in a tannery. Leather industry is undergoing a paradigm shift towards bioprocessing. Present day innovations in biotechnology have proved that enzyme assisted dehairing using proteolytic enzymes with low amounts of lime and sodium sulfide is commercially feasible. Recently, a lime free enzymatic dehairing process along with reduced amount of sodium sulfide has been standardized for cowhides, which ensures complete dehairing within 18 hrs.¹ An enzyme only dehairing method for goatskins without the use of lime and sodium sulfide has also been established.² The interfibrillary proteins, which are mostly mucoids that contain carbohydrate as prosthetic groups, are removed during fibre opening. These non-collagenous proteins are known as proteoglycans. Hence, in principle, it should be possible to produce pelt by removing the protein-carbohydrate conjugates through the action of substrate specific enzymes. It has been shown that α -amylase has specific activity on carbohydrate-containing proteins such as

proteoglycans. Thanikailvelan et al have developed the enzyme-based fibre opening for cowhides using α -amylase without using lime at pH 8.0.³ Aravindhan et al have developed enzyme-based fiber opening process for sheepskins.⁴ Usually, after the enzymatic dehairing and fibre opening the grain of the skin appears clean and white. However, in our early trials, similar enzymatic treatment on buff calfskins resulted in removal of hair with incomplete removal of epidermal layer leading to black or brown grain surface. This leads to patches in the surface of the final leather. This is primarily due to the presence of excess pigmentation as melanin in the buff calfskins. It is reported that the solubilization of melanin occurs at a pH greater than 10.⁵ The conventional liming method results in clean and white pelt due to the operational pH being greater than 10 during lime based processing. However, in the lime free enzyme-only methods, the removal of melanin is difficult during enzymatic dehairing and fibre opening, especially in buff calfskins. This is mainly due to presence of higher pigmentation in buff calfskins, which is difficult to be removed by solubilization of melanin at the operational pH of 8 during enzymatic dehairing and fibre opening process.

Melanin is a specific class of polycyclic biopolymer related to the humic acids and found throughout nature, importantly in humans and animals. Melanin is produced by the melanocyte due to tyrosinase action on amino acids. Melanin is a primary colour agent in hair, skin and eyes and it is believed to be a protective agent against the damaging effects of UV radiation.⁶ There are three main types of melanins: 1) Eumelanins: brown black pigments derived from tyrosine following its conversion to dopa (dihydroxyphenylalanine); 2) Phaomelanins: reddish-brown pigments which are cystine derivatives of eumelanin and 3) Allomelanin: black pigments (similar to eumelanins) formed from catechols *via* polyhydroxynaphthalene. Eumelanins involve the formation of indole 5, 6-quinone by several steps. Melanin is then formed by polymerization. Melanins have the ability to readily undergo reduction and oxidation reactions due to its ability to accept or donate an electron very easily over a large pH range. Melanin is a negatively charged polymer mainly due to its numerous -COO^- groups. Therefore, it is likely that it can interact with positive charges on proteins. Thus, charge interaction between proteins and melanin polymer may be one mode of melanin-protein binding. This was tested using the zeta potential meter.^{7,8}

Xylanase is an enzyme widely used for the bleaching of pulp and wood.⁹ It hydrolyzes the xylan present in the material. Xylan is the most abundant non-cellulosic polysaccharide present in both hard wood and animal plants. Bio-bleaching of wood and pulps are well practiced in the industries employing xylanase.⁹ Hence, the xylanase has been chosen to bleach the pigments present in the calfskins. It is classified under the category of hydrolases and it has acid catalytic behavior.

In the present study, the black material present in the buff calfskins were extracted and identified using UV-visible spectroscopy. Xylanase has been used during dehairing and fibre opening for the removal of pigment. The efficiency of removal of melanin by xylanase has been studied. The final quality of the leathers has been assessed through organoleptic and physical properties. Scanning electron microscopic analysis of leathers has been carried out and the results will be presented later.

EXPERIMENTAL METHODS

RAW MATERIALS

Wet salted buff calfskins from Indian origin (average weight of 3 kg per skin) were chosen as the raw material. Biodart (dehairing enzyme), α -amylase (fibre opening enzyme) and xylanase (melanin removal) were procured from Southern Petrochemical Industries Corporation (SPIC) Limited, India. All chemicals used for leather processing were of commercial grade. The chemicals used for analytical techniques were of laboratory grade.

ANALYSIS OF MELANIN

The black material from the skin is removed by gentle scrapping after standardized enzymatic dehairing, which is described below. The black material was hydrolysed by using 1M NaOH in the presence of 3% H₂O₂ in a boiling water bath for 30 min.¹⁰ After cooling, the absorption spectra of hydrolysed matter were recorded in a Perkin Elmer Lambda 35 UV-visible spectrophotometer at room temperature in the wavelength range of 200-800 nm.

STANDARDIZATION OF DEHAIRING PROCESS

In order to standardize the application of dehairing method for buff calfskins, three methods of applications were chosen namely, dip and pile method, grain side application and drum method. Two soaked buff calfskins were used for each trail. The sodium sulfide and the dehairing enzyme concentration were fixed as 0.5 and 1% respectively. The depilatory composition for different application is given in Table 1. In dip and pile method, a solution of corresponding composition was made and the pieces were mixed with the solution for 10 min. Then the pieces were piled and left overnight. In grain side application, a thick paste was prepared as per the composition and then applied on grain side, piled and left overnight. In the case of drum dehairing, the depilatory composition was added with soaked calfskins. The duration of treatment was 6 hours with 15 min running per hour. Subsequently the skins were left in the bath overnight. Next day, the calfskins were dehaired and rated on the basis of the average area without hair out of the total area.

TABLE 1. COMPOSITION OF DEPILATORY MIXTURE

Application	Water (%)	Na ₂ S (%)	Enzyme (%)
Dip and pile	15	0.5	1
Drum	15	0.5	1
Grain side	7	0.5	1

Percentages were based on soaked weight of buff calfskins.

PRELIMINARY TRIALS ON PIGMENT REMOVAL

EFFECT OF PIGMENT REMOVAL DURING ENZYMATIC DEHAIRING

Ten buff calfskins were soaked conventionally. Soaked weight of the each skins was noted. Two skins were used for each trail. The extent of removal of melanin during enzymatic dehairing by using xylanase was studied on soaked buff calfskins. The process for the xylanase treatment is given below.

Process	Chemicals	% offer	Remarks
Enzymatic dehairing (drum method)	Water	15	The duration of treatment was 6 hours with 15 min running per hour and left overnight in the bath. Next day, the extent of removal of pigment was assessed visually during manual dehairing.
	Biodart (SPIC)	1	
	Sodium sulfide	0.5	
	Xylanase	X	

X was varied as 0.1, 0.2, 0.3, 0.4 and 0.5%

Percentages based on soaked weight of calfskins.

EFFECT OF PIGMENT REMOVAL DURING ENZYMATIC FIBRE OPENING

Ten buff calfskins were soaked conventionally. Soaked calfskins were dehaired using standardized dehairing process. Two dehaired calfskins were used for each trail. The extent of removal of melanin during enzymatic fibre opening³ by using xylanase was studied on dehaired buff calfskins. The process for the xylanase treatment is given below.

Process	Chemicals	% offer	Remarks
Enzymatic fibre opening	Water	100	Run for 3 hours. Extent of pigment removal was assessed visually.
	α -amylase	1	
	Xylanase	X	

X was varied as 0.1, 0.2, 0.25 and 0.3%

Percentages based on dehaired weight of calfskins.

OPTIMIZED PROCESS FOR PIGMENT REMOVAL

Two optimized trials were selected based on the preliminary xylanase treatment trials for the removal of pigment during enzymatic dehairing and enzymatic fibre opening. Ten soaked buff calfskins were used for each optimized trial. The offer of xylanase was 0.5 and 0.3% for application during enzymatic dehairing and enzymatic fiber opening, respectively. In the case of xylanase application during enzymatic dehairing, the fibre opening was carried out using α -amylase without employing xylanase.³ A control trial was performed without the use of xylanase on ten soaked buff calfskins. The efficiency of removal of xylanase was assessed visually. Then

the calfskins were chrome tanned using a conventional post-fibre opening process without delimiting. The chrome tanned leathers were converted into upper leathers using commercial post tanning process with the offer of 14% syntan, 10% fatliquor and 2% dye.

PHYSICAL TESTING AND HAND EVALUATION OF LEATHERS

Samples for various physical tests from experimental and control crust leathers were obtained as per IUP method.¹¹ Specimens were conditioned at $26.6\pm 2.2^{\circ}\text{C}$ and $65\pm 2\%$ relative humidity over a period of 48 h. Physical properties such as tensile strength, % elongation at break and tear strength were examined as per the standard procedures.^{12,13} Experimental and control crust leathers were assessed for softness, fullness, uniformity in color, grain smoothness and general appearance by hand and visual examination. Two experienced tanners performed the assessment.

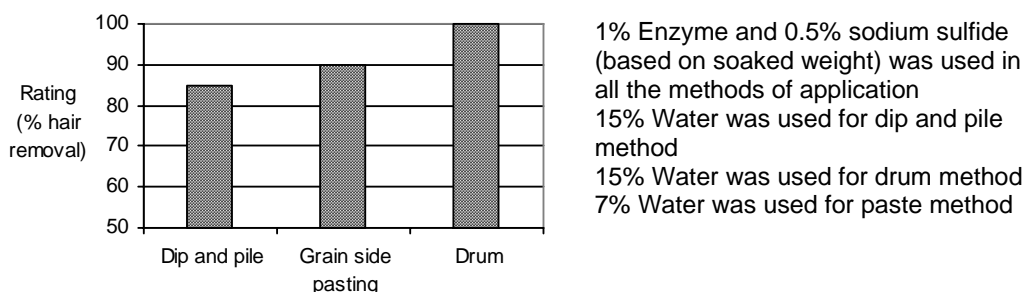
RESULTS AND DISCUSSION

The selection of raw materials has been based on the presence of higher amount of melanin in epidermal layer. It is known that buff calfskins contain higher amount of melanin as compared to other raw materials. Especially, buff calfskins from Northern part of India have the problems of non-removal of pigments during enzymatic dehairing and fiber opening. This study aims at complete removal of melanin during enzymatic dehairing and fiber opening.

STANDARDIZATION OF ENZYMAIC DEHAIRING FOR BUFF CALFSKINS

Trials have been performed in order to find the optimal application method for buff calfskins. The efficiency of dehairing for the various methods of application is shown in Figure 1. It is seen that the dip and pile as well as grain side application methods do not result in 100% removal of hair. But, the drum method results in 100% removal of hair. This method of application is different from those observed for cowhides during sodium sulfide assisted enzymatic dehairing, where painting on grain side application¹ provided complete dehairing while dip and pile method¹⁴ in the case of sodium metasilicate assisted enzymatic dehairing. This could be due to the structural and keratin-grain layer compaction difference between cow and buff calf species. Further studies were carried out based on drum dehairing method.

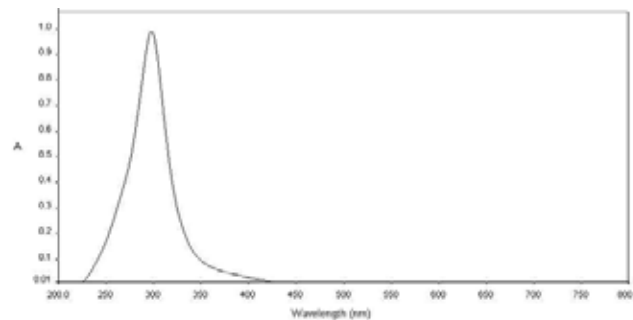
FIGURE 1. DEHAIRING EFFICIENCY BY VARIOUS METHODS OF APPLICATION FOR BUFF CALFSKINS



IDENTIFICATION OF MELANIN

It is paramount important to ascertain that the non-removed material on the epidermis of buff calfskins after the enzymatic dehairing and fibre opening process is melanin. Hence, the non-removed material from the grain surface of enzymatically dehaired buff calfskins was extracted using standard procedure. The UV-Visible absorption spectrum for the extracted solution is presented in Figure 2. It is seen that the absorption maxima for the solution extracted from the grain surface of buff calfskins is 300 nm. It has been reported that the eumelanin shows absorption maxima at 300 nm.¹⁰ Hence, it is evident that the absorption maxima at 300 nm for the extracted solution from buff calfskin is primarily due to the presence of eumelanin. Therefore, it can be concluded that the material present after the enzymatic dehairing and fibre opening is melanin.

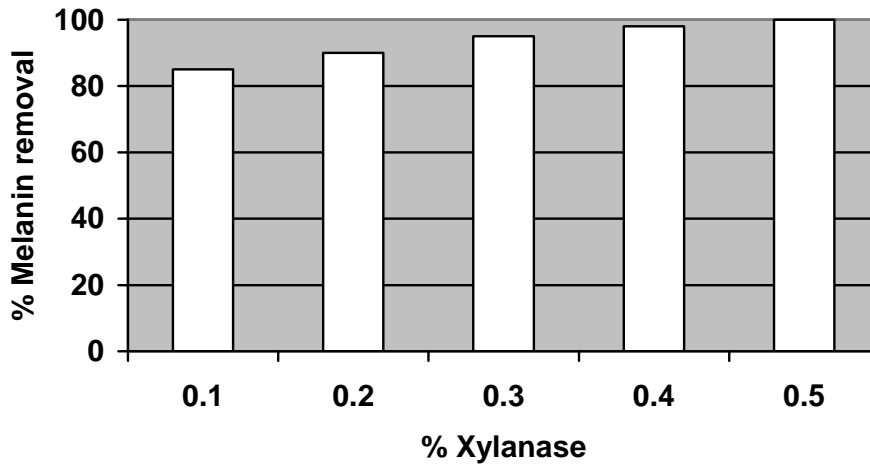
FIGURE 2. UV-VISIBLE ABSORPTION SPECTRUM OF THE EXTRACTED SOLUTION FROM THE GRAIN SURFACE OF DEHAIRIED BUFF CALFSKINS USING ENZYMES



EFFECT OF XYLANASE TREATMENT DURING ENZYMATIC DEHAIRING

The extent of removal of melanin by xylanase treatment during enzymatic dehairing is shown in Figure 3. It is seen that the extent of removal of melanin increases with the increase in concentration of xylanase. The complete removal of melanin during enzymatic dehairing is achieved at a xylanase concentration of 0.5%. The removal of melanin may be due to the action of xylanase on the adhering matter present between epidermal and melanin layer. The adhering matter may be such as proteoglycans or globular proteins. It has been postulated that the loosening of adhering substance containing glycans by xylanase results in the removal of melanin. Hence, the optimized concentration of xylanase for the removal of melanin is 0.5%.

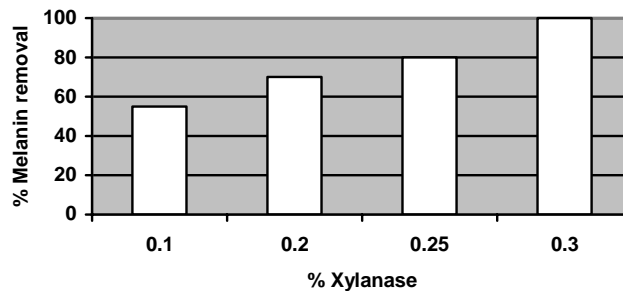
FIGURE 3. REMOVAL OF MELANIN USING XYLANASE DURING ENZYMATIC DEHAIRING



EFFECT OF XYLANASE TREATMENT DURING ENZYMATIC FIBRE OPENING

The offer of xylanase during enzymatic fibre opening was varied from 0.1 to 0.3%. The percentage removal of pigment by xylanase during enzymatic fibre opening is shown in Figure 4. It is seen that the increase in the concentration of xylanase results in significant increase in the percentage removal of melanin. At 0.3% offer of xylanase, melanin was completely removed. It is interesting to note that the 100% removal of melanin is achieved using low offer of xylanase in enzymatic fibre opening in comparison to enzymatic dehairing. This is due to the fact that substrate specificity for α -amylase as well as xylanase is almost similar. Both the enzymes act on glycans, although their mechanism of action is different. Hence, the presence of α -amylase assists xylanase in complete removal of melanin in spite of its low offer in comparison to during enzymatic dehairing.

FIGURE 4. REMOVAL OF MELANIN USING XYLANASE DURING ENZYMATIC FIBRE OPENING



SEMI-TECHNICAL TRIALS FOR MELANIN REMOVAL USING OPTIMIZED PROCESSES

The use of xylanase during enzymatic dehairing and enzymatic fibre opening resulted in 100% melanin removal at an offer of 0.5 and 0.3%, respectively. These optimized processes were carried out at semi-technical level trials along with a control trial with ten buff calfskins for each trial. The pelts from these processes were processed using conventional post-fibre opening process. The crust leathers were evaluated for strength and physical properties.

STRENGTH CHARACTERISTICS

The resultant crust leathers from xylanase treatment during enzymatic dehairing and fibre opening were subjected to physical testing using standard procedures. The physical testing data is presented in Table 2. It is seen that all the strength properties of experimental leathers are comparable to the control leather values. Importantly, tensile strength of the experimental leathers is slightly better than the control leathers. All the strength values from control and experimental are meeting the standard norms.¹⁵

TABLE 2. PHYSICAL TESTING DATA OF THE CRUST LEATHERS

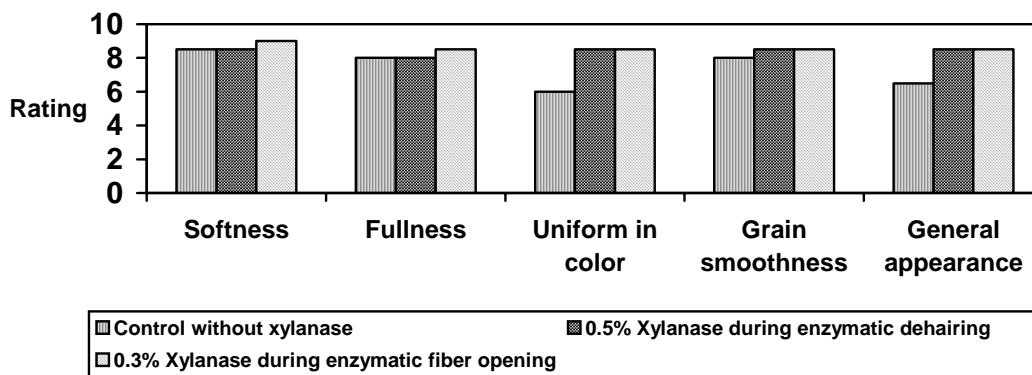
Sample	Tear strength (Kg/cm)	Tensile strength (Kg/cm ²)	% Elongation at break
UNIDO norms ¹⁵	30	200	60-70
Control without xylanase	31±2	246±12	67±5
0.3% xylanase during enzymatic dehairing	32±3	252±18	73±4
0.5% xylanase during enzymatic fibre opening	35±4	263±14	69±7

Average of mean of along and across backbone values for five leathers

ORGANOLEPTIC PROPERTIES

The crust leathers derived from xylanase treatment during enzymatic dehairing and fibre opening were assessed for softness, fullness, uniformity in color, grain smoothness and general appearance. The data is presented in Figure 5. It is seen from that the leathers made from xylanase treatment have better rating in uniformity in color indicating that they are cleaner than control leathers. The grain smoothness is comparatively better than control leathers. Softness and fullness of xylanase treated leathers are comparable or even better than that of control leathers. The general appearance of the experimental leathers is much better than the control leathers.

FIGURE 5. ORGANOLEPTIC PROPERTIES OF CRUST LEATHERS



MECHANISTIC INSIGHT IN THE REMOVAL OF MELANIN THROUGH XYLANASE

Melanin is covalently linked to the skin protein. Degradation of melanin can be achieved by using oxidizing or reducing agents. On the other hand, breaking of bond between melanin and the skin protein by employing suitable enzymes may induce melanin degradation.¹⁶ In this study, it has been hypothesized that the removal of melanin may be due to the action of xylanase on the adhering matter present between the epidermal and the melanin layer. Loosening of adhering substance containing glycans by xylanase resulted in the removal of melanin. The catalytic activity of xylanase is based on a double-displacement mechanism.^{16,17} It has been shown that the xylanases hydrolyze the β -(1,4) linked xylose backbone of xylans.¹⁷ It is interesting to note that α -amylase assists xylanase during its application in enzymatic fibre opening for the removal of melanin, which has almost similar mechanism. Two different mechanisms are suggested for the action of α -amylase such as breaking the O-linkage between the protein and carbohydrate moiety or catalyzing the hydrolysis of the α -(1,4) glycosidic linkages in glycans.^{18,19}

CONCLUSION

The non-removal of pigments from buff calfskins during enzymatic dehairing and fibre opening resulted leathers with unacceptable surface. In this study, this non-removed material was extracted from buff calfskin and identified as melanin using UV-Visible spectrophotometry. Optimization trials have been carried to find the optimal concentration of xylanase for its application during enzymatic dehairing and fibre opening. The complete removal of melanin has been achieved using xylanase during enzymatic dehairing and enzymatic fibre opening processes at 0.5 and 0.3%, respectively. Semi-technical level trials reveal that the crust leathers have similar or even better strength and bulk properties than the control leathers.

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A SPECIAL MEETING FOR A SPECIAL ALUMNI



**ALFA FELICITATES DR T RAMASAMI ON HIS APPOINTMENT AS SECRETARY,
DEPARTMENT OF SCIENCE & TECHNOLOGY, GOI**

LEATHER SORTING – A SUBJECTIVE EXERCISE

CS GNANASEKARAN

The term SORTING in day to day life refers to grouping of like things together. Grouping of things is carried out based on some criterion. For example a fruit vendor sorts the fruits based on size and sells bigger ones at a higher price and smaller ones at a different price. Similarly a diamond merchant sorts the diamond based on size and also on luster and sells them at different prices. Hides and skins which we get from different animals are highly heterogeneous in nature and are processed into different kinds of leather to meet with different end uses. A tannery is thus a *processing* unit and **not** a *manufacturing* unit and raw hides and skins of different nature and different qualities are to be sorted into different categories and processed into different kinds of leather so that maximum realization is achieved in the end product. So the success of the tanner lies in his ability to put the right material into production of the right type of finished leather. This means sorting of hides and skins in different stages of leather production is a must to be practiced and carried out by each tanner.

SORTING therefore is to be carried out in different stages of production. What is the CRITERION which we should base to sort hides and skins? Besides size and thickness which criterion decides the final end use of the leather? DEFECTS are the most important criterion which decides the final type of leather to be produced as well as the final value of the end leather produced.

What are defects prevalent in hides and skins? How they are produced? Defects are produced when hides and skins are on the body of the animal, when the animal is alive and also after the animal is dead. They are indeed called "ANTEMORTEM" defects and "POSTMORTEM" defects respectively. It is important to have a basic knowledge of these on hides and skins and carry out the sorting exercise.

ANTEMORTEM DEFECTS

Some of the ANTEMORTEM defects which are prevalent in hides and skins are as follows

1. Barbed wire and Thorn scratches, 2. Pox marks, 3. Warts, 4. Brand marks, 5. Follicular mange, 6. Ticks, 7. Barsati (rainy season defect)

BARBED WIRE AND THORN SCRATCHES

These are scratches caused on the animal's body when the animals rub against thorns, bushes or barbed wires. Some of the scratches are deep and some are superficial. Depending upon the depth of the scratches they can be considered as open defects or healed defects.

POX MARKS

In hot countries animals develop these poxes. Pox marks look like blemishes on hides and skins and this defect is not localized but spread all over the surface.

WARTS

They are ugly growths which occur along the neck of the animals and sometimes also along the body. This defect causes a hardened and damaged surface on hides and skins.

BRAND MARKS

These are produced when the animals are branded with hot iron rods. These can be considered as open defects, but these are localized defects which can be cut off.

FOLLICULAR MANGE

This defect is caused by small tiny insects (mange mites) which lay their eggs on the hair follicles and when the eggs hatch the grain is eaten and the grain is spoiled.

TICKS

These are small insects which stick to the animal's body and suck blood from animal's body. The defects caused by these insects are found in the neck and belly area. They are seen as prick marks and sometimes the depth of the pricks is to the extent of making holes. This is a very serious defect which brings down the quality of the Indian bovine hides and skins as well.

BARSATI

These defects are caused mostly on goat and sheep which are forced to be wetted in rains initially after hot summer season. This causes several wounds in the hair follicles along the back bone.

POST MORTEM DEFECTS

Post mortem defects mostly prevalent among hides and skins are as follows 1. Flay cuts, 2. Salt Stippen, 3. Red Heat, 4. Blood Stain

FLAY CUTS

These are caused by careless and improper flaying. They are mostly present in bovines which are usually flayed with a knife. The cuts are sometimes very deep and are considered as holes in hides and skins as deep cuts bring down the strength of hides and skins.

SALT STIPPEN

These defects are usually caused by improper curing due to bacterial action on the grain which results in pits holes formed on the grain surface. The pits thus caused are considered as open defects as they tend to open up more while shoe lasting.

RED HEAT

This is caused by Halophilic bacterial action on the flesh side because of the heat developed due to improper curing or handling of raw hides and skins. The defect results in leather with pipiness or looseness.

BLOOD STAINS

If hides and skins are not properly washed after flaying the blood remaining on the surface cause deep stains which makes them unsuitable for conversion into medium colored leathers.

While sorting hides and skins the above mentioned antimortem and postmortem defects are to identified and taken into due consideration. All the above mentioned defects cannot be visualized in the raw stage except a few like flay cuts, warts and brand marks. However it has now become customary to sort the raw hides and skins into two or three grades and sell them at respective prices.

LIME SORTING & PICKLE SORTING

Once the hair and flesh are removed the defects on the surface are more clearly seen. While visualizing the defects three aspects are taken into consideration which can be categorized as follows: Type of defects, Degree of concentration of defects, area of concentration of defects.

TYPE OF DEFECTS

The term "Type of defects" is defined by the nature of the defect, whether open defect, healed defect or superficial defect. Open defect brings down the value of the hides and skins drastically as they cannot be covered in the final finishing and also are shown up more prominently in shoe making as they open up more in shoe lasting, where as superficial and healed defects can be covered by judicious methodology of finishing technology. Depending upon the type of defects prevalent on the surface the sorting is carried out at this stage

DEGREE OF CONCENTRATION OF DEFECTS

This aspect also decides the final value of the leather. In some pieces the defects are found in clusters and not much of space, between the defects making the final use more difficult. Where as in some hides and skins the defects are sporadic and there is enough space between the defects enabling a better usage of the final leather produced. Accordingly sorting can be carried out taking into consideration the Degree of concentration of defects.

AREA OF CONCENTRATION OF DEFECTS

Prime cutting area is considered to be the areas where we have good physical strength as we have in butt area and other dense structural area barring flanks, hump area etc. Irrespective of the type of defect and the intensity of concentration present in the rest of the area if the prime cutting area is free from such defects, the commercial value of the hides and skins is not much depreciated.

Thus sorting of hides and skins can be considered as a three dimensional assessment which cannot be easily made by objective methods. Depending on the three dimensional assessment, the hides and skins can be sorted in the limed stage, categorized and put into right type of tanning which could enable maximum realization of value in the final leather. A similar assessment can be made in pickled stage also and put into right type of primary tanning whether chrome or vegetable tanning. Usually in a bovine tannery lime assortment is made and

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in goat and sheep skins tannery assorting is carried out in the pickled stage. Thus the lime sorting or pickle sorting helps to streamline the production in a tannery.

Having tanned the hides and skins into wet blue or E.I. tanned leather, the important exercise of sorting is to be adopted. To be precise, sorting with respect to bovine leather can be discussed in detail.

E.I. SORTING

In E.I. sorting the three dimensional assessment based on the nature of the defect, degree of concentration of defects and area of concentration of defects is applied and sorted into prime seconds, prime thirds, prime fourths and prime fifth in bovine category followed by best selection which used to be constituted by the tinny and stained pieces. The inferior and the double inferior usually called as Beedu come next. The leather with big holes and torn into pieces are segregated separately and are called Langda.

Besides the consideration of defects another criterion on which E.I. tanned leathers are sorted is on the weight range called on 1/11/4, 11/2/2 lbs and up to 3/31/2 lbs in the case of calf skins 4/4½, 5/5½ lbs and etc up to 10/10½ lbs in the case of kips. In each category the average weight should be maintained as well as maximum and minimum weight for each weight range. This enables the E.I. dressers to work on the right weight range to get the right substance and size range.

WET BLUE SORTING

In the case of wet blue in bovines usually we have selection from first to seventh grade. The basis of selection is again the same three dimensional assessments. In general up to fourth grade we can use wet blue hides for full grain finishes, fifth and top end of sixth for the corrected grain finish and the rest for linings.

An ARTICLE in FINISHED LEATHER is defined by the tannage adopted and the finish applied onto the leather. For any article if a tanner quotes a price it is not always affordable to all the buyers. The Article will be the right Article the customer requires but to suit the price the buyer can afford to pay, it is the commercial concept of a tanner which is to play a part. The tanner has to judiciously fix up a suitable proportion of two or three grades which are suitable for the article and match the price the buyer can afford to pay. If the acceptance and understanding for that composition is arrived at between the buyer and seller, then business is through. The concept is possible only if the sorting exercise is carried out in E.I. stage or on the wet blue stage as prices have been fixed for the each grade in the market. Sorting of leathers is therefore an integral part in leather production which is to be adopted in the right way in the different stages to achieve maximum realization of the leather produced.

DYED CRUST SORTING

In some tanneries the dyed crust leather before being taken up for final finishing are sorted for suitable type of finish. The top ones with out any open or healed defects are put into full aniline finish, those with healed defects are taken up for semi aniline type of finish and the third grade category for the corrected grain or printed articles. This would enable to avoid accumulation of stocks in the final finished leather produced in a tannery.

Thus sorting of hides and skins in different stages as mentioned above is a must for a tanner to be successful and the methodology applied is subjective to the type of substrate on which each tanner operates and also subject to the market he caters to whether Domestic Market or Export Market and also finally subject to the type of customer he supplies whether a shoe manufacturer or a leather goods manufacturer.

FINISHED LEATHER SORTING

Having chosen the right material for the production of right type of finish leather and got ready the final end product in a tannery i.e. FINISHED LEATHER, it is the most important role to be played by the tanner and it is the presentation of finished leather produced to the customer. For this again the important exercise of sorting is to be carried out. What are the criteria to be considered: a) Look, b) Touch, c) Feel, d) Cutting Value, e) The consignee

THE LOOK

The look of the leathers, the shine, the pattern of the grain, the shape of the leather all matters. Even if the leather has some healed defects if the look is appealing it will be graded one up.

TOUCH

The touch smoothness of the surface also plays a role in determining the grade of the leather; especially in the case of glazed kid leather sorting smoothness of the grain is very important.

FEEL

The feel of the leather is another important criterion which goes to decide the selection. Fuller and tighter leather with minor defects may go in a superior grade than defect free leather, having a tinny, pipy or loose character.

CUTTING VALUE

Cutting value is the most important criterion to be considered in grading the leather. By cutting value we mean the proportion of the area that can be utilized for cutting into panels. The leather with greater cutting value means the leather with least wastage, the leather with diminishing cutting value are progressively degraded in the selection. The top grades are bound to give more of vamps in clicking of shoes and the lower grades could give less number of vamps and more of counters and quarters.

The conception of this idea helps very much in the leather sorting. In a tannery while sorting we may find the sorter trimming off the portion with defects and making holes. All these are being

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made so that there will be less wastage or in other words more cutting value. The cutting value is a very important factor as far as the ultimate user is considered. His costing is based on the cutting value. When he buys a particular quantity of a particular mark, the user will have a statistical data with him that he should get so many pairs of shoes in the case of a shoe manufacturer or in case of leather goods manufacturer so many wallets or bags. Only when the yield goes below the minimum, disagreement with regards to the standard of selection arises between the supplier and user. Some times when we watch the German or Italian sorters sorting the leather we find that they do not reject some of the inferior quality leather instead they reduce the area of the leather by 15% or 20% so that it will be commercially viable to use and so the sorter should have an idea of the usage whether the leather goes for shoes or leather goods and etc.

THE CONSIGNEE

One should bear in mind while sorting, whether that particular consignment goes to an actual user or to a merchant. If the leathers are destined to reach the user directly he is not going to be worried about the shape or the look of the leather much. He will be satisfied if he gets the expected yield. Where as a merchant will be reselling the goods to an ultimate user after resorting and re-invoicing. He would expect an appreciation in the value of the goods on the concept should also be applied while sorting which is very subjective.

All the above factors are to be implemented judiciously in sorting the leather which requires a conception of ideas regarding the nature of defects and the best possible utilization of leather. Till now in no part of the world this concept has been made objective. The concept varies from person to person, from a leather technician to a clicker in a shoe factory, from a clicker in the shoe factory to a clicker in a leather goods factory. In no part of the world sorting is done by a computer as it is a subjective one due to following variables.

The person who does the sorting whether a leather technician, clicker of a shoe factory or a clicker of a leather goods factory

The sorting is subjective to the nature of the substrate whether it is a bovine or out of goat or sheep.

The sorting is subjective to the type of finish whether it is dull or glossy.

As mentioned earlier it is also subjective to the nature of end use.

The sorting is also subjective to the country of destination. For example Italians could buy a leather of lower selection and could afford to spend time to make the best possible use of it where as the Germans could not afford to do it.

The sorting, lastly if not least, is very much dependent upon the mental condition of the sorter similar to the mental condition of an examiner while correcting the examination papers.

All the above variables go very well to say that sorting is a subjective exercise which needs perfect conception of ideas and not an objective one to carry out with a yardstick or a computer.

LEATHER MANUFACTURING AND ECOLOGY: MY IMPRESSIONS

B.KALEEM

S.K.INTERNATIONAL

INTRODUCTION

Increasing attention has been paid to ecological considerations over the past few years. The aims and principles of ecological policy can be summarized under the terms "Sustainable development" and "responsible care". One parameter, which is often neglected, is the water consumption on the basis of raw material, in which, sheep and goat manufacturers are at advantage, because 1kg yields about 5 sq.ft area. On the other hand injustice is done to the manufacturers of cow hides where 1kg yields only about 2 sq.ft area. If the tannery accepts orders like 1.8mm or 2 mm thickness he is a looser as per the calculation. Let us take for instance, different sectors of the tanning industry. Places like Pallavaram, Ranipet and Ambur where the soil has already been polluted, have a ground water TDS of 3000 to 4000 ppm, while the areas like Erode and Dindigul have total dissolved solids of 600 to 800 ppm. Controlling the TDS to 2100 ppm will belike Ali Baba's dream, unless the input water is treated by the cheapest methods like lime, soda ash and alum, before using the water for tanning process. By reducing the total dissolved solids from 4000 ppm to at least 400 ppm before the water is used for tanning would give better exhaustion of chemicals and due to this COD and BOD could very well be controlled. On the whole apart from controlling the environmental impact, tanners can save at least about Rs.3 per sq.ft without sacrificing the quality of leather.

RAW MATERIAL

After flaying the skins and hides, it is dehydrated by applying the salt and preservatives on the flesh side in order to avoid bacterial attack. If the stock is preserved in an air-conditioned room, soaking can be minimized. Before soaking, desalting is done by drumming the hides and brushing the skins.

SOAKING

Soaking can be done in paddles and drained water should not be allowed to go to ETP and this water should be pumped to the crystallization plant.

LIMING

Options like enzymatic unhairing are being discussed but the result obtained with the help of sodium sulfide and lime along with 0.5% enzyme is the best. The hide or skin can be pasted and the hair can be removed by filtration as the keratin which is the culprit in boosting up the

COD value can be removed by screens before the water is let out to ETP. This hair-saving process produces a considerable reduction in effluent load.

RELIMING

This operation is conventional but to get higher plumping and to open up the fibre structure of the pelt it is essential to do this operation. Recycling the reliming water is risky. On the other hand this could be done by using lime powder alone to control the COD value. Let this liquor be recycled to first soaking paddles by bringing down the pH from 14 to 7 by neutralizing with acids.

DELIMING AND BATING

This particular operation is a culprit to increase the BOD value of effluent due to the use of ammonium salts. This can be controlled by a) using special ammonium free deliming which are free from sulfates and chlorides, b) using CO₂ in a closed drum and c) By recycling the delimed liquor to the first soaking by adjusting slightly the pH from 8.2 to 7.

PICKLING AND CHROME TANNING

Pickling is done by adding 7% common salt with just 50% of float and in the same bath chrome tanning and basification is done. This discharged waste liquor goes to chrome recovery plant and therefore ETP is not going to be loaded.

POST TANNING OPERATION

Washing and neutralization alone is done with sufficient good water. Treating the chrome leather with soft water having total dissolved solids of around 400 ppm initially would decrease the consumption of retanning materials. Even with less percentage of retanning agents, leather can get real good fullness, saving cost and at the same time without causing COD to rise in the let out water. The non tannins if it is not absorbed due to hard water are going to boost up the total COD value. This can be controlled by a) doing dry retanning, b) minimizing the use of extracts and c) using phenol free syntans.

DYEING AND FATLIQUORING

All dyes are made by incorporating neutral salts and this salt sediment when it goes to ETP, resulting in increase of total dissolved solids. The sediments need to be filtered and the salt should be allowed to go to the ETP or best thing would be to go in for salt free dyes. Finally the fatliquoring also should be done in a dry bath. To exhaust this, pure drinking water flooding can economize the cost with lesser percentage of fatliquor and better exhaustion by the leather. Less percentage of syntans and fatliquor with soft water alone can economize the cost and provide for better effluent control in the tannery.

GOOD HOUSE KEEPING

The concept of control of the environment involves besides process control and controlled water consumption adherence to the importance of clean house keeping. Every individual should be made responsible to keep his work area clean. The saying "Cleanliness is next to Godliness" is true in the spirit of good housekeeping. The workers should be made to realize that a clean workplace would not only improve his productivity and quality but also retard atmosphere pollution

CONCLUSION

It is a common misnomer that by using the input water of total dissolved solids having for example 4000 ppm the recycled and let out water can be around $4000 + 2100$ totaling 6100 ppm. This concept is basically wrong because this would first of all require more percentage of chemicals to get quality and the exhaustion might be poor allowing the cost to go up and at the same time such unabsorbed chemicals would boost up the COD and BOD value in the effluent tank. But at same input water having 400 to 500 ppm TDS, if it is available, then total solids can be well controlled within 1500 ppm in the recycling process.

LATEST TRENDS IN LEATHER FINISHING

TIM AMOS

A lecture delivered by Shri. Tim Amos, M/s. Stahl India exclusive to members of ALFA

If we want to look into the latest trends in Leather finishing, we have to consider the trends in 3 distinct areas: a) Specification and Performance, b) Fashion content and c) Application Technology.

SPECIFICATIONS AND PERFORMANCE

Today we are confronted, more and more often, by buyers asking that our leathers meet specifications, which are increasingly complicated, and demanding. Leather is seen as a luxury item related to the fashion industry, and fashion, technology and legislation has forced many changes upon us. It is no longer enough to make a nice piece of leather, at a price. The leather has to perform, to retain its looks in use and in wear, throughout its lifespan and in a wide variety of extreme conditions. Whether we like it or not, leather has lost its position as the automatic first choice for shoemakers, garment designers or upholsterers. High tech, high spec synthetic fibres and textile coatings saw to that over a decade ago. Today shoes and garments are made from fabrics and materials, which are waterproof, breathable, bullet proof, flame retardant, having elastic stretch, and of fibres with memory. Our buyers and end users expect the leathers we make to match the same standards of performance that those synthetics can achieve. In today's convenience driven society, leathers must be "easy care" and low maintenance, and be capable of withstanding almost endless wear, without damage or distortion until their time is over – until fashion moves on. Then they must be recyclable!

Let us look at some typical specifications for leathers – I say typical, because let's be clear, there are no definitive, universally accepted test methods or specifications, for any type of leathers. The buyers determine their own specifications.

Tanners making Automotive leathers and to a lesser extent, Furniture leathers have lived by tough specifications for many years, constantly changing and varying from buyer to buyer as warranties on the vehicles extended beyond the mechanical parts, to the interiors and the seating. Today in Europe or the USA, you can claim against the manufacturer if the seats of your car become discolored or soiled, in the same way you would if the car broke down on the roadside. I have seen cases recently where a vehicle owner complained and a car seat cover had to be replaced because of red stains caused by the driver's red suede skirt, and another caused by the driver's oily pull up belt leaving a brown line across the beige seat.

Previously, as long as the finish wore well on a piece of leather furniture, over its lifespan, and the finish stayed intact, then no one complained, they regarded it as a natural ageing process - maturing. It was considered normal if the leather changed color with age or cracked. Today this is most definitely not the case; we are confronted every day with new, higher standards and new tests. Today you as tanner or we as finish supplier have a responsibility to ensure that the

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leather used in furniture looks the same on day 1 as it does the day, say 5 or 10 years down the line when it ceases to be a fashionable or desired article which only then, has to be replaced.

We have to look at all the aspects linked to the wear characteristics, in terms of flex resistance, Light fastness, and Rub fastness or abrasion. We must consider the comfort (we are again compared to fabrics) so we have to meet WVP or Bagging or Slip Testing, and we must also consider and try to prevent accidents. Flame or cigarette testing is becoming common, when the leather must not burn when subjected to a flame, and must not support combustion when a cigarette is placed on it and allowed to burn out. We must ensure that there are no harmful substances in either the leather or finish, no heavy metals, no harmful preservative or other "toxins" should be present - should one of the younger users try to suck or eat our product.

In Shoe Upper leathers, and garment leathers, specs are also increasing week by week. With the trend for the sports and out door lifestyle in Europe and the USA, walking and sports footwear, clothing and gloves have to have fashion content as well as excellent comfort and wear characteristics. Not only do we have to pay particular attention again to the rub fastness and adhesion, but also we must consider the wet flexibility, the cold flexibility and the water uptake of the leather. Having considered the leathers performance in use, we must also be able to clean it. We are then confronted with the problems of machine washing, or dry cleaning, making sure that the leather emerges from the cleaning cycle intact and soft. With careful choice of resins, this is not a problem, but some fatliquors and nitrocellulose lacquers can be stripped leaving leathers hard and dull looking.

So that all sounds fairly depressing! Not only do you have to consider the normal parameters of tanning and leather manufacture – hide prices, currency, selection, yield and effluent and now specifications are added to our list of day-to-day problems.

But this also gives us an opportunity to get the discussion with our buyer away from price, and so I would advocate that a high specification and performance can work in our favor, and separate us from the pack – if we choose to use it.

So- how do we tackle these ever changing requirements?

The need to meet incredible specifications in the automotive leather industry have had knock on effects for all other leather types.

Polyurethane resins – have played a huge part in improving the performance of leather finishes, over the last decade – in what ways?

If we want to make high performance leathers, good adhesion between the finish and the substrate is critical for flexing, wet and dry rub and abrasion fastness. Good adhesion is essential to achieving good physical properties, and getting good adhesion can be particularly difficult with some of the modern synthetic fats and hydrophobic treatments that are used today. Fine particle size polyurethane resin binders have excellent adhesion and can give soft but very tough, very extensible films, and finishing logic is the same as building a house, in that a house cannot be strong without a solid foundation. Good adhesion is that foundation – that building block which is critical to achieving good all round physical properties.

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The aliphatic or polycarbonate PU Binders can give excellent flex characteristics 100 - 200,000 dry flexes and 50 – 100,000 wet flexes being almost common place today, we can also achieve finishes which will flex 30 –50,000 at –30C, or remain intact at +150C for 7 days.

Polyurethane topcoats are today widely used for shoe upper and leather goods leathers. They can give excellent rub fastness and solvent and chemical resistance and are much lower in solvent content than conventional solvent lacquers or lacquer emulsions. Solvent emissions will become an important environmental consideration in the next few years and residual solvents in a piece of leather are already an important consideration for some buyers. Remember that water based rarely means solvent free. Usually water based polyurethane resins and topcoats contain small amounts of very slow drying solvents, which help flow out, intercoat adhesion and help to plasticize films. These will stay in the film indefinitely if not dried off at very high temperatures.

When crosslinked, water based topcoats can be used for everything from furniture or automotive upholstery topcoats to garment leathers, giving excellent wear properties, and good feel.

Crosslinking of finishes is today an accepted practice, usually with poly aziridones or isocyanates, and they will improve the performance or selective finishes by creating bridges or links between polymer chains. All cross linking agents should be handled and used with care.

Pigments are an integral part of achieving good physical performance. The demand for good quality pigments has been bought about by 2 factors – firstly the need to get better coverage of faults and defects without loading the grain. The need to upgrade is an economic necessity today, we are being asked to finish leathers our forefathers would not have considered usable.

Secondly good quality pigments are needed to give better light fastness, in furniture and garment leathers, better heat fastness, in shoe manufacture, and better chemical resistance for all types of leather than was previously possible. Today more complaints are raised by discoloration and color change than almost anything else. With the age of Global sourcing, of leather, components and accessories, the need for accurate and consistent color control has been brought to the fore, so that the same shoe purchased in different countries will be the same, and will remain the same over time. Good pigments are a good investment, they will upgrade, cover defects and prevent problems and will save you time in matching, and they will reduce complaints and claims.

On this whole subject of migration, and color change: With the use of more synthetic fats, and more water based topcoats as well as more thorough color control, people are becoming increasingly aware of the phenomenon of dye or fat migration into water based topcoats. It is a complex subject and the mechanism is still not fully understood, but certain dyes, or components in dyestuffs, migrate through the leather, probably on “pathways” created by fats, to settle into the film of water based topcoat, creating a different surface color. This can happen over a period of a few days and will be more rapid and dramatic in hot, humid conditions. Whilst I said that the mechanism is not fully understood, why some dyes and not others, how do they move and why more common into water based topcoats, testing is relatively simple, cheap and easy to assess.

Fashion is a strange concept to most of us. How do the glossy images we see in magazines or on television affect us in our lives - they seem to bear no resemblance to the real world we live in? As the glamorous models stride up the catwalk, will we ever see these creations on the street or in the restaurant? I think the simple answer is yes we do, the designs are refined, toned down, and made more acceptable to the man in the street. Then we are asked to play our part by making leathers, for the shoes or garments. Let's remember a definition of fashion, is that "it gives the wearer of the article a sense of well being, by feeling good and attractive to others" If you feel good in something you will be tempted to pay more for it!

Fashion is good for us all, again it allows us to utilize low selection raw materials, adding value and deflecting attention away from the basic question of price.

With more and more competition from places such as China we clearly need to differentiate ourselves – and our products, we have to stand out in a crowd. We have to go out and market our company and our product, and fashion and a fashion story can create a great impression and stimulate interest. This is not difficult to do. When you travel, look in shop windows, buy any of the numerous fashion magazines, or walk around fairs – then you have your own ideas and imagination.

Fashion is a tool for us to sell more leather!

We have now emerged from a period when fashion was not fashionable – that is, when buyers wanted leather to look like leather and not textile or wood or something other than leather,

At this moment in time very soft leather is in vogue, and for this Cationic Finishes work well. Cationic finishes work because they seal the parts of the grain where the enamel has been damaged or removed by either mechanical or natural causes. They have a pH of around 4.0, which is close to the iso electric point of the leather, and hence penetrate and adhere without the need for solvents or wetting agents. Cationic finish systems are generally specially designed for softer leathers, again maintaining the crust feel, giving softer finished leather. Finishes are formulated with fully cationic range i.e. Pigments, Acrylic resins, Polyurethane resins, Binders and Fillers. Modern systems are very tolerable of anionic products giving the possibility for semi cationic or multi charge finish formulations or sandwich – cationic / anionic finishes.

As I said earlier, today it is necessary to upgrade a hide or skin in order to survive. To take a good quality raw material and make good finished leather does not make money, to take a poor raw material and make good finished leather will make money. In the days when your buyers are aware of all facets of the industry – raw material cost on a daily basis, currency fluctuations, the cost of conversion, and duty incentives, then you need to explore all avenues of upgrading. There are many good opaque resins, hybrids and special topcoat and basecoat products available. These will help give coverage or opacity by scattering light reflectance. These products work by unique film formation properties, without external dullers, which harden the film, and hence maintain flexibility. These can be added to basecoats to replace a part of the conventional binder with no loss of performance.

These are ideal to make very fashionable Dull Nappa finishes

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At the recent Linneapelle / Tanning Tech in Italy the fashion trends were quite well defined and easy to spot, and fell into 4 broad groups

Old or Distressed – using hard resins, which shrink and crack, or hard waxes: These effects suit low selections

Multi colored or two tones – on everything from suede to goatskins, or using metallics to give color change effects.

Pull Ups – subtle and waxy

Soft Waxy Full Grain and Dull Nappa finishes

APPLICATION TECHNOLOGY

In my opinion it would be foolish to talk about Latest Trends in Leather Finishing without looking at the way Engineering & Technology have forced us to look afresh at our finish formulations, our approach to finishing. Competition from low cost economies forced the European industry to look at more efficient application methods and labor saving technologies 15 - 20 years ago. I think it is worthwhile to think for a moment, and remember that India is now in a very similar position, facing tremendous competition from China. We in India can no longer compete with China on price alone. The only way we can compete and stay competitive in the global marketplace is to be more efficient and productive than our competitors and stay one step ahead in innovations and fashion content. Yes, India has low cost labor, but for how long, and what about the education standards of our workforce and the productivity per man-hour?

What about environmental legislation, new rules and legislation are not going to get less in years to come: Today the concerns are what we put down the drain; tomorrow it will be what we push into the atmosphere. So I say that in years to come India will be forced to look at clean, efficient, high productivity, labor saving devices that can make consistent high quality product. We will be forced to look at the layout of our factories and the machinery in them.

The rollercoater has probably been the most noticeable change in the finishing room over the last decade. These machines have been widely used in the USA for a long time in other industries, such as wood finishing and textiles, and started to be more widely used in the European leather industry 15-20 years ago. They are more commonly used for basecoat application; they can apply consistent quantities from 1 to 35 gms per square foot. Rollercoaters are particularly suited to corrected grain and split finishing, but today can be used for tipping and to apply designs and effects to give fashion effect in a consistent and reproducible way. They are very efficient and although often criticized by some tanners as being slow compared to spray machines, but they waste almost nothing and emissions in the air are almost zero. Most machines today operate in forward or reverse mode, and so with a selection of rollers they can be very versatile. The correct control of viscosity and rheology is important in getting the best out of these machines.

Spray technology has also changed with the introduction of HVLP spray guns, and Airless systems, wastage and emissions are greatly reduced. These operate at lower air pressure and with different airflow pattern through the gun and hence less finish “bounces back” and is

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sucked up the exhaust rather than being deposited on the leather. When you use these new guns, it may be necessary to look at the solvents used to dilute lacquers, to use slower evaporating – solvents rather than diluents, and it may be necessary to use a rheology modifier to help flow out of water based finishes.

More and more the rotary ironing machine is taking over from the glazing machine and the rotary embossing machines do away with our print overlap problems.

Embossing is something, which is underused in India, many tanners resisted paying the high prices for top quality plates or rollers, and this in my view is false economy. The rationale often quoted to me is that buyers will not buy printed leathers from India; my point is that if the leather looks printed (as it will with a cheap plate) then you have missed the point. A good sandblast or calf grain will help mask or hide grain defects or irregularities but will not look printed. A good dry milled print will help even up loose bellies. It is worthwhile to note that some of the most expensive finished leathers made and sold in high volumes for incredible prices are heavily printed, often corrected grain. They are those that go for luxury leather goods, marketed by household names in Europe, Japan and America.

It is a commonly held view in Europe, that India did not fully take the chances, which presented themselves when the leather and shoe industry moved east, from Europe and America, whereas other countries such as China jumped in with both feet and stole the initiative. India's leather industry is more mature and sophisticated than many other Asian industries, and India can still compete with the world, if it chooses to do so and recognizes the threats and opportunities, which exist. We have to build on the advantages we have, we need to make a consistent, innovative product, and market it well. We cannot sit back and wait for the world to come to us. We have to overcome the hurdles in our way, and build on good foundations and skills already in place and be aware of, and continually update ourselves on all the new techniques in leather manufacture and be a part of the Latest Trends in Leather Finishing.