



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 5.2  
IJAR 2015; 1(9): 977-982  
www.allresearchjournal.com  
Received: 18-06-2015  
Accepted: 20-07-2015

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## A Review on Leather Processing

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### Abstract

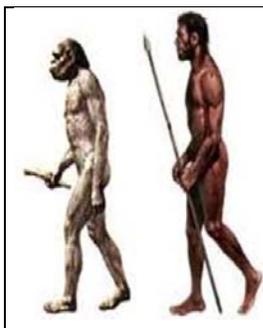
*Leather is a durable and flexible material created by the tanning of animal rawhide and skin, primarily cattle hide. It was extensively used from the primitive times and is widely used today. Leather is not a textile material but it acquires vivid use in textiles. Leather is enduringly beautiful and no piece of the leather is same. India is the largest livestock holding country 21% large and 11% small animals are present in India. Today some of the animals are killed primarily for the meat production. The skin and hides from the meat industry may create a major pollution and environmental problem. They may be either burned or buried in the landfill. This had led to the evolution of big leather tanneries for leather production. Leather industries are of great economic importance these industries add value to the raw hides. Leather production does not encourage the killing of more animals. Rather it makes sure that no part of the animal is wasted. Therefore there has been an increasing emphasis on optimum utilization of available raw materials for maximizing export of leather goods. Since India is exporting much of the hide and skin to the other countries and if these are exported in the form of finished goods it will lead to the greater economic growth of our country.*

**Keywords:** leather, leather processing, tanning, properties.

### Introduction

Leather is a durable and flexible material created by the tanning of animal rawhide and skin, primarily cattle hide. It was extensively used from the primitive times and is widely used today. Leather is not a textile material but it acquires vivid use in textiles. Leather is enduringly beautiful and no piece of the leather is same. Natural grain, variation in the grains, good breathability and other natural features are all signs that the material is genuine.

### History of leather



In prehistoric times man was concerned mainly with eating or collecting the food, clothing did not exist. The impulse towards the clothing is dedicated towards hunting. The primitive man realized that they are not only for food but can also be used for the clothing purpose. Animals were more fortunate than human being, so they started using animal's skins to satisfy their clothing needs. Animal skin was first worn by the people in the Paleolithic period. Later on man realized that the skins rapidly putrefied and thus became useless. They needed a way to preserve the hides. People found that the quality of the leather could be improved so they started preserving the hides/skins by rubbing them with fats and animal's brains, these primitive people also preserved the skin by the smoke of wood fires

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but this procedure had a limited preserving and softening action. Later on tannin from the bark of certain trees was used to convert raw skins into soft material, today which is known as “vegetable tanning”. Some similar process of tanning is still in used today.

**Need to produce leather in India**



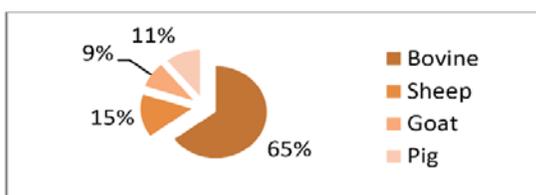
**Picture of slaughter house man pulling the hide from the cattle**

India is the largest livestock holding country 21% large and 11% small animals are present in India. Today some of the animals are killed primarily for the meat production. Slaughterhouse or Abattoir is a facility where animals are processed for consumption as food products. According to statistics compiled by the food and agriculture organization of the United Nations (FAO) Total number of animals slaughtered 1980 were 66,299,600 and number of animals slaughtered 2004 126,239,000, which is just double. About 40 -45 % of the animal part is converted into edible product i.e. meat, 15% is the waste and 40-45% is turned into byproducts such as leather, soaps, candles, and adhesives. The hides of animal are left over products of the meat industry. The skin and hides from the meat industry may create a major pollution and environmental problem. They may be either burned or buried the in the landfill. This had led to the evolution of big leather tanneries for leather production.

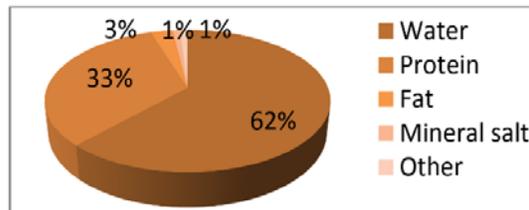
Leather industries are of great economic importance these industries add value to the raw hides. Leather production does not encourage the killing of more animals. Rather it makes sure that no part of the animal is wasted. Therefore there has been an increasing emphasis on optimum utilization of available raw materials for maximizing export of leather goods.

**Sources of leather**

Various sources of leather production are Pig, Horse, Deer, Cow hide, Calf, Sheep, Goat, Reptiles etc.



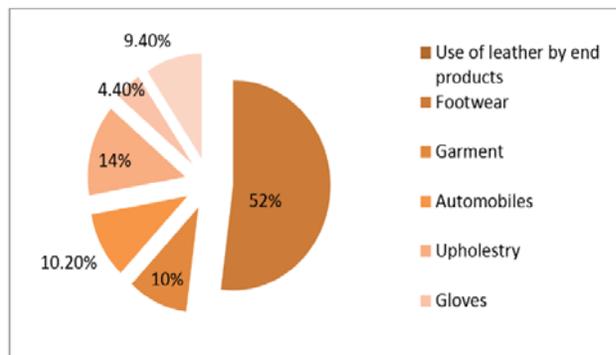
**Percent share of animals in leather production (2007)**



**Chemical composition of the animal skin**

**Properties of leather**

- ❖ **Heat resistance:** It provides excellent heat insulation because of large amount of entrapped air which is the poor conductor of the heat and makes it resistance to the heat.
- ❖ **High tensile strength:** It has a high tensile strength and is resistant to tearing this depends upon the type of hide or skin or the method of tanning.
- ❖ **Abrasion resistance:** Leather is resistant to abrasion in both wet and dry conditions
- ❖ **Elasticity and plasticity:** Leather possesses the properties of being elastic as well as plastic i.e. it can be made to stiffen or can be made to be flexible.
- ❖ **Water resistance:** The penetration of the water through the leather depends mainly on the wettability of the leather fibers, which depend upon the type of tanning used.
- ❖ **Fire resistance:** Leather is inherently resistance to heat and flame.
- ❖ **Resistance to mild acids and alkalis:** strong acid and alkalis chemically damage and weaken the leather but it can withstand mild acids and alkalis.



**Consumption of leather in World (2007)**

**Production of leather**

Leather has long outgrown in its practical purpose and today is regarded more as a luxury than a necessity. The global industry is valued at about Rs.3964.4 billion (71.27 Billion Euro). Most of the producing countries are developing countries, yet China and Italy are the leading producing and exporting nations in the world with exports worth Rs. 886.16 billion (15.93 billion Euros) and Rs. 606.32billion (10.901 billion Euros) respectively. India ranks at the third place amongst the leather production and export countries. The

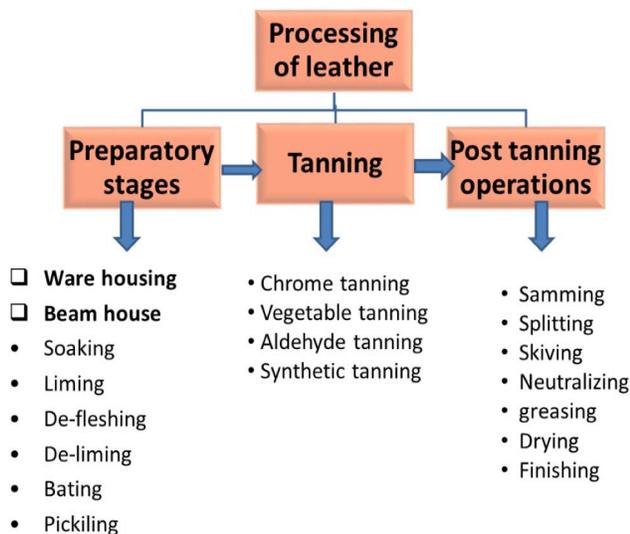
Indian leather industry is one of the most vibrant sectors of the country's economy. It is well-structured and spans various segments, such as tanning and finishing, footwear and footwear components, leather garments, leather goods, including saddles and harness. Leather industry is well recognized in the international market, the Indian leather goods constitute about 7 per cent of India's export earnings. Besides being a significant earner of foreign exchange, the leather Industry generates employment, ensuring jobs for over 2.5 million people, with 75 per cent of the production from small and cottage sectors. The annual availability of hides and skins from meat industry has become the main strength of these leather industries.

**The major leather production centres of India**

States	Cities
<b>Southern Region</b>	
Tamil Nadu	Chennai, Ambur, Ranipet, Vaniyambadi, Trichy And Dindigul
Andhra Pradesh	Hyderabad
Karnataka	Bangalore
<b>Northern Region</b>	
Delhi	Delhi
<b>Eastern Region</b>	
West Bengal	Kolkata
<b>Central Region</b>	
Uttar Pradesh	Kanpur And Agra
<b>Western Region</b>	
Maharashtra	Mumbai

**Different leather articles produced in India**

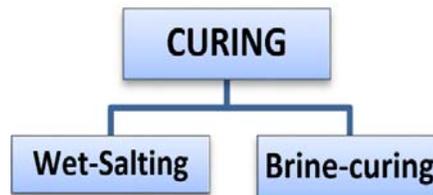
Item	Capacity
Leather shoe	100 million pairs
Leather sandals	78 million pairs
Leather Garments	6 million pieces
Leather Goods	70 million pieces
Industrial Gloves	40 million pairs
harness	6000 pieces



**Processing of leather**

**Preparatory Stage**

**Warehouse:** it is a place where curing of hide is done. Hide are preserved in salt and stored in controlled cool temperature.



a) **Wet-Salting:** Is done by salting the hide. Skins are piled together until they form a moist bunch. Curing is done for one month, so that the salt can completely absorb into the skin.



Wet salting

b) **Brine-curing:** It is more common than wet-salting. It is faster, easier method. During brine curing, hides are positioned carefully in vats and mixtures of salt and glycolipid surfactant are applied and it is kept for 10-16 hours after the hides or skins are completely cured they are ready to move on to the next stage.

**Beam house**

1. **Soaking:** The skin is soaked in water to remove blood, dirt, salt, dung etc.



Drum for soaking the hide

2. **Liming:** The hides are soaked in lime and sodium sulphide, the soaking and liming takes place for 24-36 hours liming is done to remove the hairs, and nails. It also remove soluble proteins like mucin and natural grease and fats to some extent. Swelling of the collagen in the hide takes place

3. **De-Fleshing:** In this process tissues, flesh and fat remnants are removed by a roller mounted knife.



De-fleshing



Tanning drums



Fleshing Roller

**Forms of leather tanning**

- a) Vegetable tanning
- b) Chrome tanning
- c) Aldehyde tanning
- d) Synthetic tanning

**a) Vegetable tanning:** Vegetable tanning is being used from centuries, and is still used today. Tanning is done by tannin. Tannins are mixtures of phenolic compounds. These ingredients found in vegetable matter, tree barks etc. (Oak, chestnut, mangrove etc.) the leather produced by vegetable tannins are suitable for leather carving or stamping

**Disadvantage of the vegetable tanned leather**

- Not stable in water. It tends to discolor.
- If it is left to soak and then dry it will shrink and become less supple and harder.
- It is difficult to obtain soft, flexible leathers, especially at medium and high thickness.
- Vegetable tanning agents have their own intrinsic color, in browned shades, brilliant shades cannot be obtained.

**b) Chrome tanning:** Tanning is done by using chromium sulphate and other salts of chromium. It gives more supple and pliable leather than vegetable-tanned leather. It does not discolor or lose shape as vegetable-tanned leather. More colors are possible using chrome tanning.

**c) Aldehyde tanning:** Tanning is done using glutaraldehyde or oxazolidine compounds. This leather is also known as wet-white leather due to its pale cream or white color.

**Advantages of Aldehyde- tanned leather**

- Outstanding smoothness
- Water absorbent potential

**Disadvantage of Aldehyde- tanned leather**

Use of formaldehyde in this tanning process is hazardous to the workers.

**d) Synthetic-tanning:** Leathers are tanned by using aromatic polymers such as the novolac or neradol. It was developed when the vegetable tannins were in short supply. This leather is also white in color.

**4. De-liming:** Ammonium chloride is used for de-liming for the removal of alkali and the consequent de-swelling of the fibers.

**5. Bating:** It is done to make leather pliable and for the removal of unwanted protein from the raw hide. *Protease enzymes* are used for this process. eg. Palkobat, Palkocid

**6. Pickling:** The final step in preparing the hides for actual teenage is called pickling. During pickling sulphuric acid is added, and to prevent acid swelling salt is added to the hide to bring to the neutral pH or chemical balance. After this process the skin can be shipped or stored for long period of time without deteriorating.

**Tanning**

It is the process which converts the protein of the raw hide into a stable material which will not putrefy.

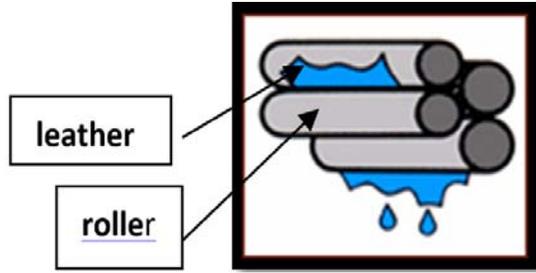
**Difference between tanned material and raw hides**

Tanned material	Raw hides
flexible	Inflexible
does not become putrid (smells bad) when wetted back	it putrefy when wetted back

**Tanning process:** The hides are loaded in a drum and immersed in the tanning liquor. The tanning liquor depends on the tanning ingredient to be used.

### Post Tanning Operations

1. **Samming:** During this process water is removed.



2. **Splitting:** The leather is splitted into Grain split and flesh split. The split-leather can then be processed further as suede.



Splitting machine

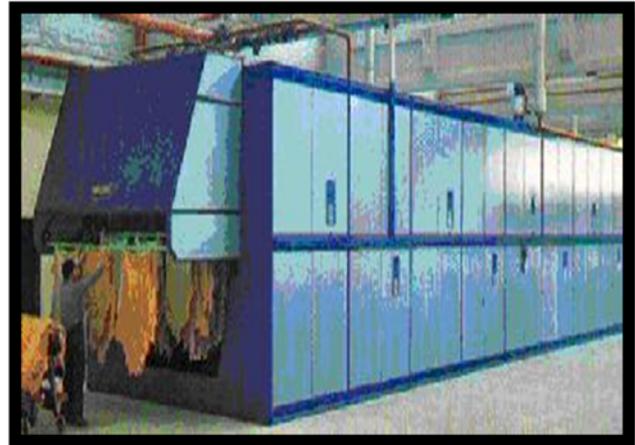
requirements. Some leather are only surface dyed while others need completely penetrated dyeing as in case with suede leather the dyeing is carried out in drums, and generally anionic dyes are used.

6. **Greasing:** The tanned fibers are treated with reactive oils, which attach themselves to the fibrous structure and lubricate them so that leather can achieve correct softness.

7. **Drying:** Two methods are used to drying leather

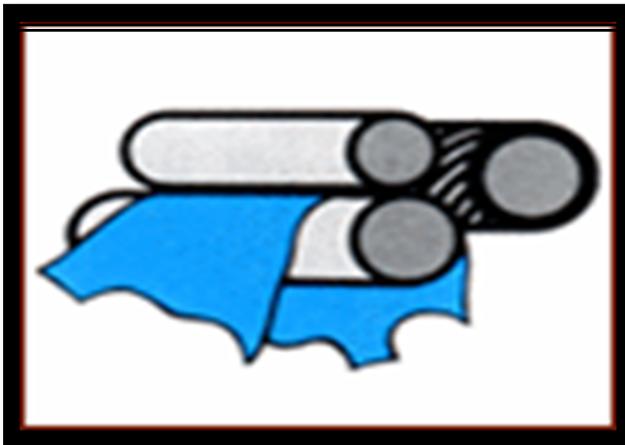
a) **Oven drying:** The leather are fixed in the frame and dried in the oven.

b) **Vacuum drying:** The leathers are put on the large hot plate another plate presses down and sucks the water out of leather by creating a vacuum.



Oven drying

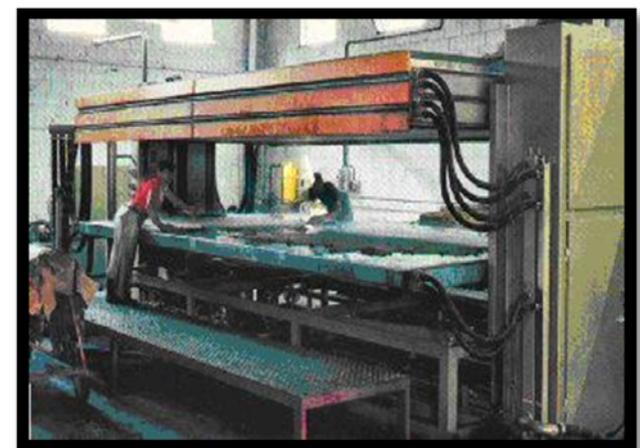
3. **Skiving:** The grain leather is brought to an even thickness. Irregularities are removed from the reverse side.



Skiving

4. **Neutralizing:** After teenage, the leather must be neutralized to remove unwanted acids to prevent deterioration during the drying process, and to prepare the leather for next stages in processing. Neutralizing is often carried by the mild alkalies.

5. **Dyeing:** The dyeing of the leather into a wide variety of the colors play an important part in meeting the fashion



Vacuum drying

8. **Finishing:** Leather is given its final surface treatment such as coating with pigments or dyes, embossing all these cover defects such as scars, horn damage etc.

### Conclusion

It is a matter of great pride that Indian leather goods have been making a new way in the world of fashion. The leather industry has a long history but the pace of change has been rapid from the twentieth century. The time required to process hide or to finish the leather has decreased from time to time. Quality and variety of product have improved

according to customer demand and fashion trends. Governments of India is also promoting leather and leather goods and have sanctioned Rs.912. 67 crores in the 11th five year plan under Indian leather development program (ILDPA) for technology upgradation, modernization training and developments of designing institutes for leather. Since India is exporting much of the hide and skin to the other countries and if these are exported in the form of finished goods which will lead to the greater economic growth of our country therefore this area require a research work for maximum utilization of the available raw material to make its processing more environmental friendly and improve its quality for the variety of end uses.

#### **References**

1. Valentin MM. Leather craft. The Mac Millan company. New York, 1972, 16-20.
2. <http://Eco-friendly option for leather processing industry - Technology News India.mht>. Retrieved on 09, March, 2007.
3. <http://Leather - Wikipedia, the free encyclopedia.mht>. Retrieved on 10, march, 2009
4. <http://Brain Tanned Leather. mh>. Retrieved on 20, jan, 2009
5. <http://leather/Beamhouse - Tannery.mh.mht> Retrived on 27, Oct, 2010.
6. <http://Overview of leather industry.mht> Retrived on 23, Oct, 2007.