

CHAPTER-1

HIDES & SKINS

The outer coverings of big domestic animals like cow, buffalo and horse are called hides. Whereas those of small domestic animals like sheep, goats are known as skin.

Primitive man covered himself with the skins of animals he killed. They had three major defects:

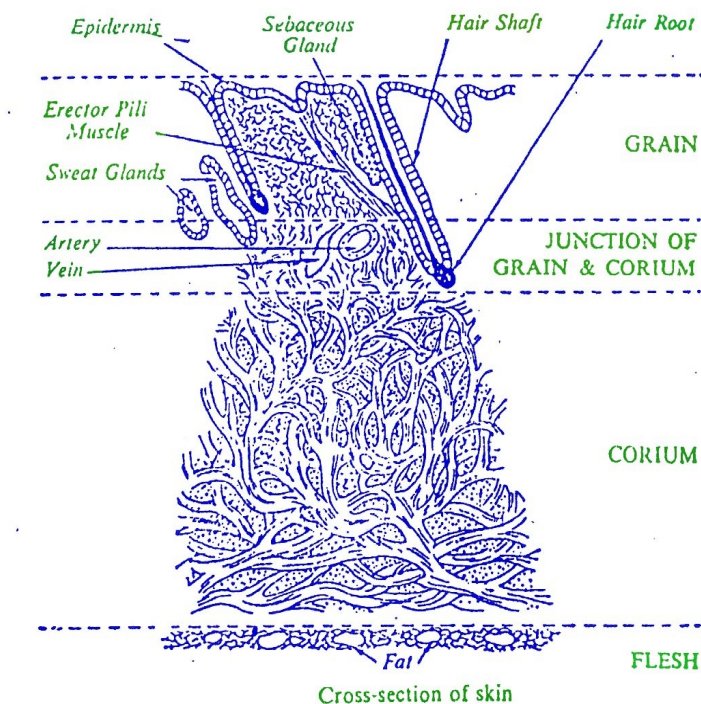
- They were dump,
- They would putrefy,
- They lost their flexibility and softness upon drying (they dried the skins to stop putrefaction.)

CHEMICAL COMPOSITION OF HIDES & SKINS

The chemical composition of fresh hides and skins falls approximately within the following limits:

- Water 60%-65%
- Protein 25%-30%
- Fats 5%-10%

STRUCTURE OF HIDES AND SKINS



Most hides and skins consist of three parts, such as

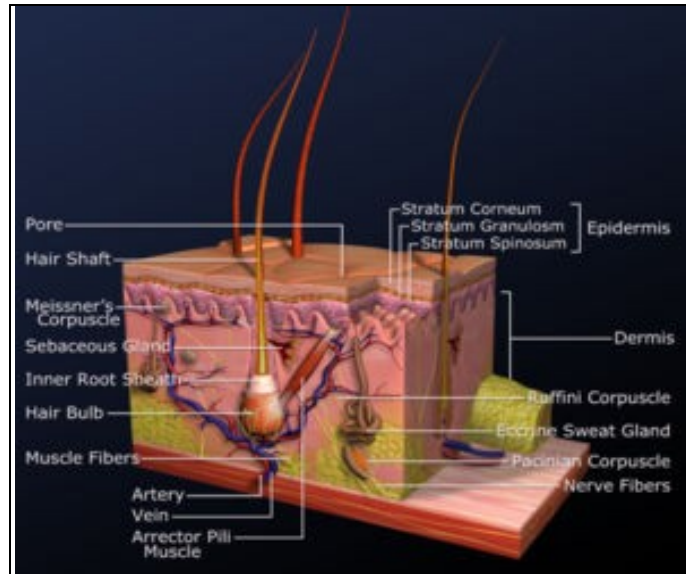
- (i) Epidermis,
- (ii) Corium or true skin and
- (iii) Hypodermic or adipose tissue.

The epidermis is a comparatively thin layer which forms the upper boundary of the skin. This layer measures only 1% the total thickness of the skin and serves to protect the corium which is the most important part of the skins.

The corium is a much thicker layer of connective and other tissues which constitute the true leather forming substance of the hides and skins. The corium is divided into two distinct layers:

(a) Corium minor or grain

layer: It is the top of the corium constitute about one fifth of the total thickness of corium and differs structurally from the main part. This layer has a characteristics grain pattern which is actually the pattern of hair follicles depending on the structure of the hides and skins.



(b) Corium major or reticular layer: This is the main part of corium appearing as net like fibers of connective tissues.

The entire corium is an interwoven structure consisting of several fibers grasped together. The fibril again consists of several protofibrils. In practice, the corium or true skin is that portion of the hide or skin. Which is called pelt, and from which the hair has been removed.

The adipose tissue is the tissue left adhering to the flash side of the hide of skin. It consists chiefly of fat cells, containing tallow like fats, with a few scattered fibers. There is also some muscular tissue. All these structure are useless for the manufacture and must be removed in the flashing operating after suitably preparing the pelt in the soaking and liming processes.

So, in the preparation of the hides or skins the epidermis the adipose tissues must be removed leaving curium which is converted into leather.

CATTLE HIDES

The names "bull" and "cow" refer to mature, entire male and female animals respectively while "ox" and "steer" imply the castrated male animal. All these have large skins and are thus known as large hides, which in the raw

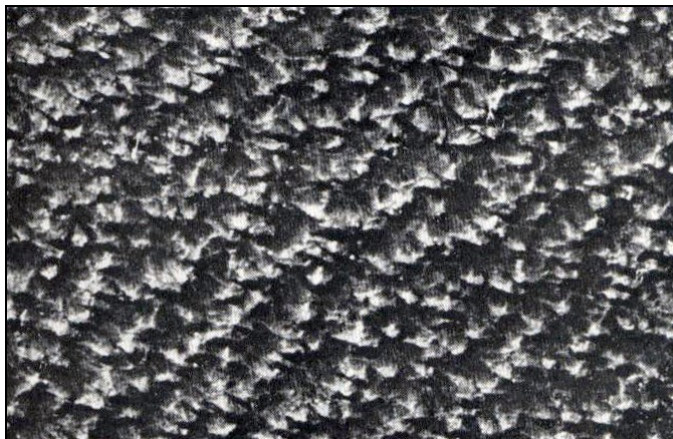


Fig.: Grain pattern X10 of leather from cattle hides.

(flayed) state may weigh between 30 and 90 lb. "Veals" imply the skins of younger animals and generally have raw weights between 14 and 25 lb but "calf" refers to fairly young stock with skin weights ranging from 4 to 12 lb. The breed of animal is of course important, the best hides for leather purposes usually coming from those animals which are bred for beef production, i.e. those which develop carcasses with a high proportion of lean meat in a reasonably short time under conditions of economic feeding. These hides, available from all the beef-producing countries of the world, are very tough and firm, fairly uniform in thickness and having a "square" form, since breeding programmes are designed to produce a body conformation with minimal amounts of tissue in the neck, leg and belly regions. On the other hand, the dairy breeds of cattle usually have a more open dermal fibre network, being very loose and thin in the belly (particularly in the females) whilst the overall distribution is less "square".

CALFSKINS

These are widely available but only a few countries provide high quality material for the leather trade. Diet is an important factor; milk-fed animals produce skins with extremely smooth grain and a dermal



Fig.: Grain pattern X10 of calfskin leather.

network of fine, even texture so that those of French, Italian, Swiss, South German and Czechoslovakian origin are regarded as the best available. Calves fed on barley meal, hay, oil-cake, etc., are slightly more coarse skinned. In Europe, calfskins are at their best early in the year (from April to June) when the animals are young and before they begin to feed themselves and become coarser. Female skins are more valuable than those of bull calf for they combine a reasonable toughness with fine grain and even texture; they develop their fibre network more quickly than the male animals and will therefore withstand tougher conditions of processing. British, Dutch, North German and Danish skins are of reasonably good quality, as are dry-salted Cape (Rhodesian) calf and New Zealand calf. The sun-dried Indian and East African calfskins tend to be thin and to have many grain faults.

PROPERTIES OF COW HIDE:

- 1) Fiber length is medium.
- 2) Number of fibers is huge.
- 3) The thickness of hair is medium.
- 4) The fiber bundles of female are more uniform than male.
- 5) Only one hair grows from one hair follicle.
- 6) Fiber weaving is parallel.

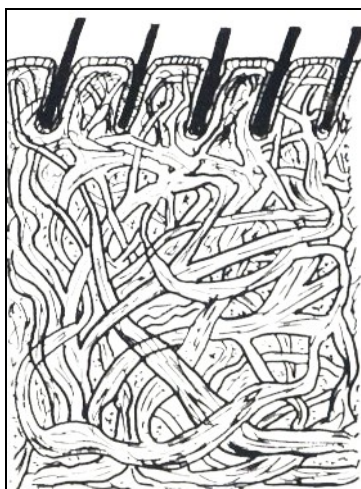


Diagram of vertical section through cattle hide.

- 7) Fiber structure is compact at butt area and lower in neck and belly side.
- 8) The hair is random, scattered on the grain surface.
- 9) Fat gland is optimum.
- 10) The hair root does not fully enter into the corium layer.
- 11) Grain surface is smooth.

PROPERTIES OF CALF SKIN:

1. The epidermis of calfskin is thinner than cowhide.
2. Grain surface is smooth.
3. Fat content is less than cow.
4. Calf skin has 100% cutting value.
5. The hair follicles are much smaller than cow.
6. Collagen bundles have fine structure as compared to cow hides and useful for the finest of leather.

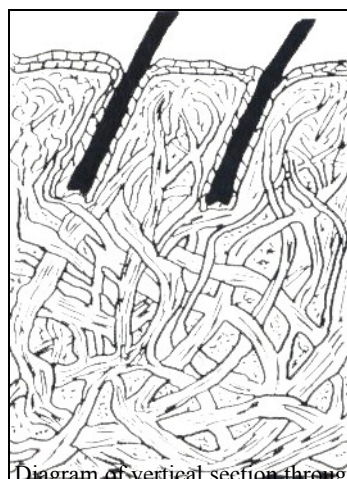


Diagram of vertical section through calf skin.

CONDITIONS OF BANGLADESHI COWHIDES:

Bangladesh has a good source of raw hides and skins. Everyday thousands of hides and skins are produced from whole country by killing animals in the slaughters house and by various ways. Basically, the Bangladeshi cow hides are of poor substance, because we can't take proper care of them.

Bangladesh is an agricultural country. The farmers are having cows to plough the lands, to run the carts and in the dairy firms (less percentage) to get the milk and meat. The farmers utilize the cow carelessly which is enough to spoil the covering parts of the crows. The dammars dare fed swell. Moreover the lesions animal's parasites, many disease and injuries may occur. As far, we are getting the poor quality cow hides. Besides, various flaying cuts are also seen. Very often faulty curing is done i.e. the butcher does not cure the hides or skins properly. Sometimes, they use mud to make the leather weight and often the customers are confused to detect the correct grading for hiding the defects by mud.

Some times fresh salts are not used and inadequate curing (less salt) is done which causes putrefaction damage and growth of parasites. Further more, temperature are not controlled at the time of storage properly.

So proper curing with suitable salt like fresh NaCl, Naphthalene and bactericides should be used if we like to cure for longer period. In the tanneries of Bangladesh, generally we get high quantity of hides and skins at the time of 'Kurbani Eid'. Due to faulty and inadequate curing we lose 10-20% of raw stock.

If we take proper care for collections and preservation of raw hides and skins and then converted these raw materials into various types of finished leather with correct manufacturing process, they not only meet our demand but also are an important way of earning a lot of foreign exchange. So, the government and all stages of people should be conscious about this.

RESPONSIBLE CAUSES FOR THE POOR QUALITY OF COW HIDES IN BANGLADESH

The following defects available in our Bangladesh cow hides, defects whose are responsible for the poor quality occur in hides have specific cause originating either alive or after death. The former is called pre-mortem and the later post-mortem defects are expressed below.

Some defects may be common on hides of all animals while others are characteristic of hide particular causes of animals.

Defects of Hide

	Ante-mortem		Post-mortem
1.	Poor sunstance	1.	Flaying defects
2.	Sore marks of abscesses	2.	Inadequate curing
3.	Branded wire scratches	3.	Defects due to late-curing
4.	Rub mark, horn rake	4.	Curing with unsuitable salt
5.	Brand marks	5.	Faulty drying
6.	Goad marks	6.	Faulty storage
7.	Yoke marks	7.	Crack-grain
8.	Ticks, Fleas	8.	Vulture scratches
9.	Scabies	9.	Poor pattern
10.	Pox		
11.	Wable fly or grubs		
12.	Cockle		
13.	Borsatis & Danas		
14.	Ringworm sears		
15.	Soiling by dug and urine		

CHAPTER 2

THE STORY OF LEATHER

Primitive man hunted wild animals for food; he removed the hides and skins from the dead animal carcass and used them as of leather dates from the Palaeolithic period, cave paintings discovered in caves near Lerida in Spain depict the use of leather clothing. Excavation of palaeolithic sites has yielded bone tools used for scraping hides and skins to remove hair.



The skins rapidly putrefied and became useless, so a method of preservation was needed. The earliest method was to stretch the hides and skins on the ground to dry, rubbing them with fats and animals brains while they dried.

This had a limited preserving and softening action.

Primitive man discovered also that the smoke of wood fires could preserve hides and skins, as did treating them with an infusion of tannin-containing barks, leaves, twigs and fruits of certain trees and plants. It seems likely that man first discovered how to make leather when he found that animal skins left lying on a wet forest floor became tanned naturally by chemicals released by decaying leaves and vegetation.

Much later the use of earth salts containing alum as a tanning agent to produce soft white leather was discovered. The alum leathers could be dyed with naturally occurring dyestuffs in various plants.

Wall paintings and artifacts in Egyptian tombs indicate that leather was used for sandals, clothes, gloves, buckets, bottles, shrouds for burying the dead and for military equipment. The ancient Greeks and Romans also made extensive use of leather and it has remained an important industrial raw material since those times. The Romans used leather on a wide scale for footwear, clothes, and military equipment including shields, saddles and harnesses. Excavation of Roman sites in

Great Britain has yielded large quantities of leather articles such as footwear and clothing.

The manufacture of leather was introduced to Britain by invaders, the Romans, and by religious communities, whose monks were expert at making leather, especially vellum and parchment for writing purposes. The ancient Britons had many uses for leather from footwear, clothing and leather bags, to articles of warfare. The hulls of the early boats, known as coracles, were also covered in leather.

Through the centuries leather manufacture expanded steadily and by mediaeval times most towns and villages had a tannery, situated on the local stream or river, which they used as a source of water for processing and as a source of power for their water wheel driven machines. Many of these tanneries still exist, but in many towns the only remaining evidence is in street names, like Tanner Street, Bark Street and Leather Lane.

EARLY LEATHER PRODUCTION

The earliest crude leathers were made by first immersing the raw hides and skins in a fermenting solution of organic matter in which bacteria grew and attacked the hides or skins, resulting in a loosening of the hair or wool and some dissolving out of skin protein. The hair or wool was then scraped off with primitive blunt stone or wooden scrapers and fat or meat still adhering to the flesh side was removed in a similar manner. Tanning, the conversion of pelt into leather, was done by dusting the rawstock with ground up bark other organic matter and placing them in shallow pits or vats of tannin solution. Further additions of ground bark, were made from time to time until the tannin solution had penetrated right through the skin structure, taking up to two years for very thick hides. The leather was then hung up for several days in open sheds. The dressing of the leather involved paring or shaving it to a level thickness, colouring, treatment with oils and greases, drying and final treatment of the grain surface with waxes, proteins such as blood and egg albumins, and shellac to produce attractive surface finishes.



During the middle ages leather was used for all kinds of purposes such as: footwear, clothes, leather bags, cases and trunks, leather bottles, saddlery and harness, for the upholstery of chairs, and couches, book binding and military uses. It was also used to decorate coaches, sedan chairs and walls. Many leather articles have been recovered from the Mary Rose, a Tudor vessel which sank in 1545.

The majority of the leather was tanned with oak bark but soft clothing, gloving and footwear leathers were tanned with alum, oil, and combinations of these two materials.

With the discovery and introduction of basic chemicals like lime and sulphuric acid, tanners gradually abandoned their traditional methods and leather production slowly became a chemically based series of processes. Sir Humphrey Davy, the inventor of the miner's safety lamp, investigated some of these processes.

The growth of industrialisation in the 18th and 19th centuries created a demand for many new kinds of leathers, eg, belting leathers to drive the machines being introduced into industry, special leathers for use in looms in the textile industry, leathers for use as diaphragms and washers, leathers for use in transport and for furniture upholstery.

At the end of the nineteenth century, the invention of the motor car, modern roads, new ranges of coal tar dyestuffs, the demand for softer, lightweight footwear with a fashionable appearance, and a general rise in the standard of living created a demand for soft, supple, colourful leather. The traditional vegetable tanned leather was too hard and thick for these requirements and thus, the use of the salts of the metal chromium was adopted and chrome tanning became the tannage for modern footwear and fashion leathers. It produces soft, supple, beautiful and fine leathers, reflecting the way we live

The Worshipful Company of Leathersellers

The Worshipful Company of Leathersellers supervised the control of the quality of mediaeval leather produced in the City of London. They received their first Charter of Incorporation in 1444 from King Henry VI, having been granted articles for the regulation of their craft during the first Mayoralty of Richard Whittington in 1398.

Through the centuries the Company has played an important role in the leather industry, particularly in the field of technical education. The Company founded a technical college in Bermondsey in 1909 and in 1978 donated £500,000 for the erection of The National Leathersellers Centre at University College Northampton. The Company continues to maintain close links with the college and the industry as a whole and has recently been involved with the development of new premises for the Leather Conservation Centre, also located on the University College Northampton site.

CHAPTER 3

LEATHER



Real leather is a natural product. It breathes, is warm and durable and has individual characteristics which make each hide unique. Leather will always bear the marks of its natural origin and these characteristics can show as scratches, growth marks, areas of differing fibre density and hair pore structure.

These characteristics in no way detract from the wearing qualities of the leather. With use it develops a patina which enhances its beauty.

Legal Definition

In the UK a definition of leather is set out in the British Standard Glossary of Leather Terms (BS 2780) and this definition is used as a guide in applying consumer protection legislation such as the Sale of Goods Act and the Trade Descriptions Act. In short, if a product is made from reconstituted leather fibres or if the surface coating is too thick then it cannot be sold as 'leather'.

BRITISH STANDARD DEFINITION (BS 2780)

Hide or skin with its original fibrous structure more or less intact, tanned to be imputrescible. The hair or wool may or may not have been removed. It is also made from a hide or skin that has been split into layers or segmented either before or after tanning.

Note 1: If the leather has a surface coating, the mean thickness of this surface layer, however applied, has to be 0.15mm or less.

Note 2: If the tanned hide or skin is disintegrated mechanically and/or chemically into fibrous particles, small pieces or powder and then, with or without combination of a binding agent, is made into sheets or forms, such sheets are not leather.

GENERAL PROPERTIES OF LEATHER

The physical properties which make leather a unique and valuable material for upholstery purposes are:

1. High tensile strength
 2. Resistance to tear
 3. High resistance to flexing
 4. High resistance to puncture
 5. Good heat insulation
- Leather contains a great deal of air, which is a poor conductor of heat. This is an important comfort consideration.

Permeability to water vapour

- Leather fibres will hold large quantities of water vapour. This property enables leather to absorb perspiration, which is later dissipated. A significant factor in comfort.

Thermostatic properties

- Leather is warm in winter and cool in summer.

Mouldability

- Leather can be moulded and will retain its new shape. It has both elastic and plastic properties in wear.

Resistance to wet and dry abrasion

- These properties, concerned with wear and maintenance, are controlled by the tannage and surface finish. These have now reached high levels of excellence.

Resistance to fire:

- Leather is inherently resistant to heat and flame.

Resistance to fungi

- Leather is resistant to mildew.

Resistance to chemical attack

- The atmosphere of modern cities is polluted from the burning of carbon fuels with sulphur dioxide gas, which can accelerate Scope, aims and objectives of the project work:

Leather industries are one of the leading export earning sectors of Bangladesh which contribute a lot to the national economy. According to Export Promotion Bureau, Bangladesh earns 836.15 core taka or 140.04 million US dollar from this sector in 2005(July-Dec). But at the same time this sector is one of the major source of environmental pollution in Dhaka city specially for the Burigonga River and related areas.

In Bangladesh there are over 200 tanneries at present. These tannery units during processing of raw hides and skins produce about 8.47 million liters liquid wastage per day but in general there are no treatment or recycle facilities. These untreated liquors when discharged without any recycling to drains and finally to nearby low lands, municipal sewers and rivers with various toxic parameters such as high BOD, COD, TDS, SS excessive concentration of sulfide, heavy metal content (Cr, Al etc), nitrogen content, ammonium content, neutral salts, chlorides, oils & fats, variable pH, dyes & pigments, solvents etc are causing serious pollution to air, land and water and damaging land fertility as well as surface water system. Thus they disrupt the aquatic ecology as well as the total environment.

- Besides Bangladesh tannery effluent is one of the major environmental concerns all over the world and several attempts are trying to reduce their pollution load. Hong-Duck Run , Sang-III Lee, and Keun-Yook Chung described in their study that seawater induced flocculation of alkaline tannery wastewater can increase the removal efficiency of organic compounds,. Chuan, MC; Liu, JC Chuan, MC; Liu, JC assessed the release

behavior of chromium from tannery sludge in their study. Fundamental properties of sludge were characterized. O. A. Fadali; Y. H. Magady; A. A. M. Daifullah; E. E. Ebrahim; M. M. Nassar; described that, tannery effluent can be characterized not only by heavy loads but also with toxic heavy metals especially chromium ions. Thakur, I. S. studied the effects of tannery effluents on soil health, crops, water resource, and human health, and discusses different pollution control measures for these contaminating materials. the deterioration of leather. Modern leathers are tanned and dressed to resist these harmful chemicals.

THE NATURAL CHARACTERISTICS OF LEATHER

Real leather is a natural product. It breathes, is warm and has individual characteristics which make each hide unique. Leather will always bear the marks of its natural origin and these characteristics can show as healed scars, growth marks, areas of differing fibre density and hair pore structure. These hallmarks in no way detract from the wearing qualities of the leather. They are signs discerning owners cherish when buying leather. With the passing of time and use, it develops a patina which enhances its beauty.

Growth Marks and Veins - These are an indication of the age of the animal and in that respect are similar to the graining on a piece of timber. They range from often quite pronounced marks in the neck area to subtle bands across the hide perpendicular to the backbone. Heavy growth marks are often placed on the outside backs of seating.

Scars - These form usually as a result of barbed wire damage or by the horns of other cattle. In their healed form the new skin is as strong as the remainder of the hide but unhealed damage should be avoided as tension on these parts may cause the leather to split or burst.

Grain Variation - The fibre texture varies greatly from being loose in the belly and flank areas to being relatively tight across the backbone. The looser areas consequently have more stretch. The variation in hair pore structure is particularly noticeable in untextured leathers where clusters of open pores can sometimes be seen.

Shade Variation - No two hides are alike and due to the varying grain structure mentioned above the dyes and finishes penetrate to differing degrees in different parts of the hide to give an attractive variation. Whilst every attempt is made to achieve uniformity this is not always possible and sometimes not desirable.

TYPES OF LEATHER

In general, leather is sold in three forms:

- **Full-Grain** leather or **Top-Grain** is referring to the upper section of a hide that contains the epidermis or skin layer. It refers to hides that have not been sanded, buffed or snuffed (otherwise known as Corrected) in order to remove imperfections on the surface of the hide. Only the hair has been removed from the epidermis. The grain remains in its natural state which will allow the best fiber strength, resulting in greater durability. The natural grain also has natural breathability, resulting in greater comfort for clothing. The natural **Full-Grain** surface will wear better than other leather. Rather than wearing out, it will develop a natural "Patina" and grow more beautiful over time. The finest leather furniture and footwear are made from Full-Grain leather. For these reasons only the best raw hide are used in order to create **Full-Grain** or **Top-Grain** leather. Full grain leathers can mainly be bought as two finish types: [aniline](#) and [semi-aniline](#).

- **Corrected-Grain** leather is any **Top-Grain** leather that has had its surfaces sanded, buffed or snuffed in order to remove any imperfection on the surface due to insect bites, healed scars or brands. **Top-Grain** leather is often wrongly referred to as **Corrected-Grain**. Although **Corrected-Grain** leather is made from **Top-Grain** as soon as the surface is corrected in any way the leather is no longer referred to as **Top-Grain** leather. The hides used to create corrected leather are hides of inferior quality that do not meet the high standards for use in creating aniline or semi-aniline leather. The imperfections are corrected and an artificial grain applied. Most Correct leather is used to make Pigmented leather as the solid pigment helps hide the corrections or imperfections. Corrected grain leathers can mainly be bought as two finish types: [semi-aniline](#) and [pigmented](#).

- **Split** leather is leather that is created from the fibrous part of the hide left once the **Top-Grain** of the raw hide has been separated from the hide. During the splitting operation the grain and drop split are separated. The drop split can be further split (thickness allowing) into a middle split and a flesh split. In very thick hides the middle split can be separated into multiple layers until the

thickness prevents further splitting. Split leather then has an artificial layer applied to the surface of the split and is embossed with a leather grain. Splits can also be used to create **Suede**. The strongest suedes are usually made from grain splits (that have the grain completely removed) or from the flesh split that has been shaved to the correct thickness. Suede is "fuzzy" on both sides. Suede is less durable than top-grain. Suede is cheaper because many pieces of suede can be split from a single thickness of hide, whereas only one piece of top-grain can be made. However, manufacturers use a variety of techniques to make suede appear to be full-grain. For example, in one operation, glue is mixed with one side of the suede, which is then pressed through rollers; these flatten and even out one side of the material, giving it the smooth appearance of full-grain. **Latigo** is one of the trade names for this product. A reversed suede is a grained leather that has been designed into the leather article with the grain facing away from the visible surface. It is not a true form of suede.

The International Union of Leather Technologists and Chemist Societies has a full glossary of leather terms that can be found at [IULTCS](#)

Other less-common leathers include:

- **[Buckskin](#)** or brained leather is a tanning process that uses animal brains or other fatty materials to alter the leather. The resulting supple, suede-like hide is usually smoked heavily to prevent it from rotting.
- **[Patent leather](#)** is leather that has been given a high gloss finish. The original process was developed in Newark, New Jersey, by inventor Seth Boyden in [1818](#). Patent leather usually has a plastic coating.
- **[Shagreen](#)** is also known as **Stingray skin/leather**. Applications used in furniture production date as far back as the [art deco](#) period. The word "Shagreen" originates from France and is commonly confused with a shark skin and stingray skin combination.
- **Vachetta leather** is used in the trimmings of [luggage](#) and [handbags](#), popularized by [Louis Vuitton](#). The leather is left untreated and is therefore susceptible to water and stains. Sunlight will cause the natural leather to darken in shade, called a [patina](#).

- **Slink** is leather made from the skin of unborn calves. It is particularly soft, and is valued for use in making gloves.

- **Deer Skin** is one of the toughest leathers, partially due to adaptations to their thorny and thicket filled habitats. Deerskin has been prized in many societies including indigenous Americans. Most modern deer skin is no longer procured from the wild, with "deer farms" breeding the animals specifically for the purpose of their skins. Large quantities are still tanned from wild deer hides in historic tanning towns such as [Gloversville](#) and [Johnstown](#) in upstate [New York](#). Deer skin is used in jackets and overcoats, professional sporting equipment such as [kendo bogu](#), as well as high quality personal accessories like handbags and wallets. It commands a high price due to its relative rarity and proven durability.

- **Nubuck** is top-grain cattle hide leather that has been sanded or buffed on the grain side, or outside, to give a slight nap of short protein fibers, producing a velvet-like surface.

There are two other descriptions of leather commonly used in specialty products, such as briefcases, wallets, and luggage.

- **Belting leather** is a full grain leather that was originally used in driving pulley belts and other machinery. It is often found on the surface of briefcases, portfolios, and wallets, and can be identified by its thick, firm feel and smooth finish. Belting leather is the only kind of leather used in luxury products that can retain its shape without the need for a separate frame; it is generally a heavy-weight of full-grain, vegetable-tanned leather.

- **Nappa leather**, or Napa leather, is chrome-tanned and is extremely soft and supple and is commonly found in higher quality wallets, toiletry kits, and other personal leather goods.

The following are not 'true' leathers, but contain leather material.

- **Bonded Leather**, or "Reconstituted Leather", is not really a true leather but a

man-made material composed of 90% to 100% leather fibers (often scrap from leather tanneries or leather workshops) bonded together with latex binders to create a look and feel similar to that of genuine leather at a fraction of the cost. Bonded leather is not as durable as other leathers, and is recommended for use only if the product will be used infrequently. One example of bonded leather use is in Bible covers.

- **Bicast leather** is a man-made product that consists of a thick layer of polyurethane applied to a substrate of low-grade or reconstituted leather. Most of the strength of bicast leather comes from the polyurethane coating. Bicast was originally made for the shoe industry and recently was adopted by the furniture industry. The original formula created by Bayer was fairly strong, but creating Bicast from the original recipe is expensive. Most of the Bicast used today is created using inferior generic chemicals resulting in an inferior material. The result is a much stiffer product that tends to delaminate resulting in bubbles and cracking.

LEATHER IN MODERN CULTURE

Leather, due to its excellent abrasion and wind resistance, found a use in rugged occupations. The enduring image of a [cowboy](#) in leather chaps gave way to the leather-jacketed and leather-helmeted aviator. When motorcycles were invented, some riders took to wearing heavy leather jackets to protect from road rash



and wind blast; some also wear chaps or full leather pants to protect the lower body. Many sports still use leather to help in playing the game or protecting players: due to its flexible nature it can be formed and flexed for the occasion.

As leather can also be a [metonymical](#) term for objects made from it, the term leathering is as logical as tanning in the sense of a [physical punishment](#) (such as a severe [spanking](#)) applied with a leather [whip](#), [martinet](#) etcetera.

[Leather fetishism](#) is the name popularly used to describe a [fetishistic](#) attraction to people wearing leather, or in certain cases, to the garments themselves. The word leather itself became synonymous with [sado-masochism](#) in the 1980s after achieving that status in [homosexual jargon](#) in the 1970s.

A number of [rock groups](#), particularly [heavy metal](#) groups such as [Judas Priest](#) and [Scorpions](#), are well-known for wearing leather clothing. Leather clothing, particularly jackets, almost come as standard in the heavy metal subculture. [Extreme metal](#) bands, especially [black metal](#) bands, have extensive leather clothing, i.e. leather trousers, accessories etc.

In today's times, many cars and trucks come optional or standard with 'leather' seating. This can range from cheap vinyl material, found on some low cost vehicles, to Nappa leather, found on luxury car brands like [Mercedes-Benz](#) and [Audi](#).

RELIGIOUS SENSITIVITIES TO LEATHER

In countries with harmonious multi-religious environments, leather vendors are typically careful to clarify the kinds of leather used in their products. For example, leather shoes will bear a label identifying the animal from which the leather was taken. In this way, a follower of [Islam](#) would not accidentally purchase [pigskin](#) leather, and a [Hindu](#) would avoid [cow](#) leather.

Such taboos increase the demand for religiously neutral leathers like ostrich and deer. Judaism forbids wearing leather-soled shoes during [Yom Kippur](#) and during mourning.

In Muslim countries the products made in Leather were normally banned as due to the religious concerns imposed by some Islamic scholars but in the mid of 20th century some eminent scholars from Muslim world have made significant efforts to bring awareness about this issue amongst the people which ultimately starts the trend of using leather products especially leather jackets, wallets, handbags and lot of other customized leather articles.

THE LEATHER MAKING PROCESS:



Curing

Raw hides and skins must be preserved to stop them deteriorating before the leather-making process can begin. Methods of preservation include salting, chilling, freezing and the use of biocides.

Soaking

Cured hides or skins are soaked in water for several hours to several days. This allows them to reabsorb any water they may have lost in the curing process or during transportation. It also helps to clean them of salt and dirt.

Painting

Painting is a method by which wool can be removed from sheepskins using a sulphide based mixture.

Liming

Liming removes the epidermis and hair. This also results in alkaline swelling of the pelt to cause a controlled breaking of some of the chemical crosslinks of the collagen.



Fleshing

After liming the pelt is passed through a machine to remove fleshy tissue from the flesh side. Hides may be split into layers at this stage or after tanning.

Deliming

The principal action of deliming is to gradually neutralise the alkali in the pelt, avoiding rapid changes in pH which could lead to distortion or disruption of the tissues.

Bating

A long delime can significantly improve the removal of any remaining lime, scud (miscellaneous debris) and residual components broken down during liming. Bating - based on the use of enzymes - completes this process so that the pelt is flat, relaxed, clean and ready for pickling and tanning.

Pickling

Weak acid and salt solutions are used to bring the pelt to the weakly acid state required for most tanning processes. Stronger pickling solutions are used to preserve pelts so that they can be stored or transported in a stable form over periods of several months.

Degreasing

Solvents or water-based systems can be used to remove excess grease before tanning.

Tanning

Tanning converts the protein of the raw hide or skin into a stable material, which will not putrefy and is suitable for a wide variety of purposes. Tanning materials form crosslinks in the collagen structure and stabilise it against the effects of acids, alkalis, heat, water and the action of micro-organisms. The



Splitting

A splitting machine slices thicker leather into two layers. The layer without a grain surface can be turned into suede or have an artificial grain surface applied.

Shaving

A uniform thickness is achieved by shaving the leather on the non-grain side using a machine with a helical blades mounted on a rotating cylinder.

Neutralisation

Neutralising removes residual chemicals and prepares the leather for further processing and finishing.

Additional tanning material may be applied to give particular properties which are required in the finished leather.

Dyeing

The dyeing of leather into a wide variety of colours plays an important part in meeting fashion requirements. Some leathers are only surface dyed, while others need completely penetrated dyeings, as is the case with suede leathers.

**Fatliquoring**

Fatliquoring introduces oils to lubricate the fibres and keep the leather flexible and soft. Without these oils the leather will become hard and inflexible as it dries out.

Samming

This process reduces water content to about 55% and can be achieved by a number of machines, the commonest being like a large mangle with felt covered rollers.

Setting out

The leather is stretched out and the grain side is smoothed. This process also reduces the water content to about 40%.

Final drying

Leather is normally dried to 10-20% water content. This can be achieved in a number of ways and each method has a different effect on the finished leather:

Staking and dry drumming



A staking machine makes the leather softer and more flexible by massaging it to separate the fibres. To finish off the leather may be softened by the tumbling action inside a rotating drum.

Buffing and Brushing

The flesh surface is removed by mechanical abrasion to produce a suede effect or to reduce the thickness. In some cases the grain surface is buffed to produce a very fine nap, e.g. nubuck leathers. After buffing the leather is brushed to remove excess dust.

Finishing

The aims of finishing are to level the colour, cover grain defects, control the gloss and provide a protective surface with good resistance to water, chemical attack and abrasion.

Final grading

Leather will be graded before despatch to the customer. This grading may consider the colour intensity and uniformity, the feel of the leather, softness, visual appearance, thickness, design effects and natural defects such as scratches.

Measurement

The area of each piece of leather is measured by machine. Nearly all leather is sold by area so accurate measurement is important.

CHAPTER 4

THE HISTORY OF BAGS



The history of handbags provides a fascinating insight into both men's and latterly women's developing need to carry a range of items about with them as they walked around their houses and travelled away from home. Over the last five hundred years or so, a bag or purse would enable them variously to secrete small valuables, such as jewels and money, close to the body; to attend to personal hygiene and comfort, with the aid of such as a comb and a mirror; and to engage in a number of pleasurable duties, activities or pastimes of daily life -like writing a diary, doing some knitting or tatting, or playing a card game, to pass time on journeys and when staying away from home, or just when moving to another wing of the house or around the family estate.

An early form of bag or wallet was the drawstring leather pouch which carried coins, and which was looped through men's girdles or belts for safety. It was a simple development of a circle of fabric drawn up together with two lines of stitching going round the edge in parallel lines in different directions and knotted to make the drawstrings. This was seen from the 12th to the 16th centuries, often worn with a dagger or knife. Such pouches could in fact be stolen by determined thieves who would cut them loose. This suspension of a functional object from the belt has parallels with the medieval 'chatelaine', a chain with keys attached about the waist, which was necessary for housekeepers even when simply moving from wing to wing within the larger houses of England. The chatelaine was revived in the 1840s as a device for suspending needlework and domestic tools, such as a pair of scissors, a tape measure, a thimble case, button hook, penknife, and needle-case from a device hooked onto the waist-belt.

From the 16th century there were also 'sweet' bags for the ladies, which were like lavender bags, made of a variety of available herbs to scent their handkerchiefs, and to disguise foul smelling odours from privy and street. A variant was the metal

pomander. Men might carry letter-cases, which were large wallets for important documents, and gaming purses, for counters (and winnings), often with a coat of arms, crest or initials in evidence. They also had tobacco pouches, from the 17th century. For long and extended journeys luggage travelled in large trunks, but the more precious and intimate items were carried about the person.

Pockets were also introduced into clothes for carrying such small personal belongings. If we look at wardrobe accounts from the 16th century we find that these pockets were actually called 'bagges'. They would require about three quarters of a yard of material, inserted into the side seam, and were at first mainly seen in the garments of royalty and nobility - male and female -, but more and more as an essential part of the main garment. As men's suits appeared from the 1670's, men's pockets transferred to their coats and waistcoats, as very visible functional and increasingly decorative features, to carry a watch on a fob chain, a snuff box, a visiting card case, and a handkerchief. By the 18th century ladies' side dress pockets became so large and so useful for carrying a multitude of items that they were often made separately, and attached singly or in pairs onto a band which tied around the waist. Access to the pockets was provided through slits in the skirts. This is the significance of the children's nursery rhyme,

Many of these separate pockets have survived in museum collections across Europe, though not all are correctly identified as such! These were effectively bags under the skirt as opposed to visible accessories, and as such are often plain and unremarkable, and look rather like peg bags (which is perhaps what many became). In the 18th century there were flat pochette purses, beautifully embroidered for love letters and bank notes.

In the late 18th and early 19th centuries, when the silhouette of female dress was so figure hugging with the Neo Classical Empire and Regency line, pockets in a garment or beneath it were almost impossible, and would certainly have spoiled the hang of the skirt, so ladies carried delicate little drawstring bags or purses called reticules, or 'ridicules'. These could carry a handkerchief, fan and dance card, a scent bottle, some face powder and rouge, but nothing too weighty. They were traditionally of some lightweight fabric such as pale coloured silk satin, prettily

embroidered, or knitted silk. There are clear parallels in style and decoration between reticules and the somewhat larger needlework bags which had emerged to carry wools and tatting and embroidery threads. These are the origin of the Dorothy bag. Later there were drawstring shoe bags and dressing bags and the idea has persisted in P.E. bags and laundry bags.

In the Victorian period an extraordinary variety of types of bag appeared, in fabrics which matched or co-ordinated with different outfits, and which suited different fashionable styles of dress, and demonstrated different needlework and knitting skills. In the 1830s and 1840s flat square or circular bags were quite literally canvases for a range of decorative designs in wool-work and chenille, beadwork and ribbon-work, and ladies' magazines described how to make them.

Small knitted, netted or crocheted silk or cotton coin purses are also characteristic of this period and were known as stocking purses, or 'miser' purses. By mid century these had metal fastenings and the whole was often made of a delicate metal chain, which supported sovereigns and half sovereigns, hence the term 'sovereign purse'. Chamois leather was also used, together with metal rings to secure the coins. Sovereign cases were of circular metal design, with an internal spring to release a coin at a time. It is worth noting that in North America handbags are still called purses, which may refer back to their introduction there from Europe after 1800, when they were still primarily coin purses. In the 1870s there was a novelty knitted jug purse, of which Hampshire Museums has an excellent example.

In the 1870s, with the slim figure hugging skirts of the princess line of the 1870s, chatelaine bags were introduced which were suspended from the wrist or the belt respectively. They sometimes had a little pocket inside for a coin or ticket. These were often made of plush, a thick velvet pile fabric. The same material is also seen on the larger holdalls, which women used for travelling. Then there were carpet bags literally made of canvas embroidered with wool, sometimes known as tapestry, which were immortalised in the story and film of the Edwardian nanny Mary Poppins. Leather portmanteaux, with a flat bottom and expanding sides, on a metal frame with a metal catch, are often called Gladstone bags after Queen

Victoria's Prime Minister William Gladstone. Portmanteaux means literally 'carry mantle', and certainly they could be draped with the silk capes popular in the 1840s and the large shawls worn by Victorian women in the crinoline period. A travelling parasol could be popped inside or an umbrella placed lengthwise across the top between the handles. Muffs might also have an integral purse or small handbag incorporated from the 1880s to the 1910s.

Here were specialised bags for different social occasions such as an opera bag for opera glasses, and fan, together with mirror, and powder puff. Whole vanity cases emerged with ointment bottles, brushes and mirror, to act as a travelling toilet bag.

By the early 20th century it had become almost inconceivable for a European woman not to carry a capacious handbag when going away from home for more than a few hours. Unlike hats, which began to lose popularity in the post war era, handbags have persisted, but they have adapted to changing needs in form and style. Cigarettes, cigarette holders and matches were a 20th century vogue which have come and largely now gone. Reading, distance and sunglasses in their protective cases take up a considerable amount of space in a modest handbag. Clutch bags are not the most practical style, but enjoyed considerable popularity from the 1930s to the 1960s for elegant evening soirees. Raffia and patchwork were popular mid century, and a wide range of plastics post war.

Shoulder bags were introduced during the Second World War when some concealed gas masks in a box-like design, and these - like sword holsters and sashes before them- were worn diagonally, but for most women from the 1950s to the 1990s the shoulder bag rested on the shoulder and hip of one side only - usually the opposite side to the handedness of the person - (ergonomically unsound), and there have been attempts in the 21st century to reintroduce the diagonal strap -not least because the contents of bags can often now include mobile phones and purses with heavy loose change and a range of other weighty items, from glasses cases and pens to make up bags, mirrors, and hairbrushes, to diaries, and even library books, depending on the size of the bag! There was a vogue in the 1970s for men carrying bags which were like large oblong wallets, and could carry a passport,

purse, tickets, tissues, and still attach to a waist belt if required. These were replaced by or paralleled by 'bum bags' suspended from a waist belt.

The contents of a handbag or purse at any given moment over the last few hundred years would surely bear ready testament to the preoccupations and interests of its owner, and of the age in which they lived. In terms of function, the bag or purse need only ever be of sufficient size and strength to bear its contents, but inevitably the bag quickly became a highly decorated accessory, demonstrating of itself skills in needlework, and making, if home-made, and of a design concept and careful choice of materials, if manufactured or professionally crafted.

Handbags can wear out, literally with the weight and nature of the objects placed inside them - a sharp needlework implement or hair pin can wear a hole, a host of coins can rub, a stitching can come undone at points of intense wear or friction, or where placed on the ground. Leather (and plastic) bags are still repaired at cobblers.

Designer handbags are the most expensive not necessarily because of their suitability or durability but because of the designer name and its social cachet.

VARIOUS TYPES OF BAG:

1. Hand bag
2. Shoulder bag
3. Frame bag
4. Evening bag
5. Cosmetic bag
6. Beach bag
7. Shopping bag
8. Diverse bag
9. Document case
10. Executive or High official bag
11. Laptop carrier bag
12. Luggage bag
13. Travelling bag
14. Folio bag
15. Courier bag
16. Commercial bag
17. Under arm bag
18. Sports bag
19. Bum bag
20. Golf bag
21. Tote

LADIES' LEATHER BAGS



Leather bags are a status symbol for fashion-conscious women who enjoy flaunting the labels of costly international brands. Increasingly, however, their bags carry the logos of Hong Kong manufacturers who

honed their craft producing quality goods for illustrious designers like Pierre Cardin, Ralph Lauren and Enrico Coveri but are now developing their own distinct identities.

BAG LEATHER

Leathers which are used for the manufacturing of different types of bag are known as bag leather. Mostly these are chrome or vegetable tanned from lower grade raw stock having thickness 1.0-1.5 mm (or above for some particular article).

Combination tanning is carried out with a combination of chrome, vegetable, synthetic or other tanning agents to improve the fullness and firmness and some other desired properties of shoe upper. The main combinations are semi-chrome and chrome-retanned leather. Leather is first tanned with vegetable and then retanned with chrome tanning agent is semi chrome retanned leather. Chrome retanned leather is softer and flexible and mostly used as shoe uppers.

PROPERTIES OF BAG LEATHER

- The physical appearance of finished leather should look attractive with clear grain.

- The leather must possess a soft and mellow 'handle' with fine and tight 'break' on the grain. The must be stable against repeated tensile and compressive strains and bending.
- The leather must possess high strength properties i.e. tensile strength, stitch tear strength, split tear strength, elongation at break etc.
- The leather must possess the hygienic property of being permeable to water vapor and air.
- The finish on the leather should have high adhesion and must be durable against wet and dry rubbing.
- Should be highly colour fast.
- Should have dry and wet rub fastness.

THE MAIN REQUIREMENTS OF IDEAL BAG LEATHER:

AESTHETIC APPEAL

The leather should have elegant attractive appearance. Elegant appearance requires that the grain surface must be distinguishable from that of a leather substitute and colors, gloss and grain appearance should be attractive and appeal to the buyers of the bag. The leather should retain the colour, should not stain wearer's clothes and should have ability to take polish. Not only looks but also the feel of the leather by touch in the shoe are important.

PHYSICAL PROPERTIES

The most important requirements for bag leather are good adhesion (wet and dry) rub fastness and high temperature performance during plating, hot air drying and lasting. Strength and stretch of upper materials used in shoe making are good guides for their suitability. Low strength and stretch of upper leather and consider unsuitable for use as shoe uppers.

The important physical properties of upper leather which determine its suitability use in shoe making are:

1. Tensile strength
2. Stitch tear strength
3. Split tear strength
4. Elongation at break
5. Distension at grain crack

CHAPTER-5

PIGMENT

A pigment is any particulate matter that is insoluble in and essentially physically and a chemically unaffected by the media into which it is dispersed.

According to part, of course, all insoluble dispersed and inert materials are not pigment. When all the desirable factors like, particle size and shape, nature of surface, refractive indices, crystal structure etc. Of insoluble dispensable inert materials are satisfactory, then only they can be considered as pigments. Some of those desirable factors for a pigment are explained bellow: -

Particle size:

The covering power of a pigment largely depends upon its particle size. Smaller the particle size, higher is the covering power. The particle sizes of commercial pigments vary from fine colloidal particles (0.01 μm) to relatively coarse particles (100 μm).

Shape:

The shape of pigment particles determines, to a great extent, the strength of bondage is strong when the particles are irregular is shape and pointed sharp edge.

Nature of surface:

The nature of surface of a pigment particle should be such that it can easily reflect that light waves which represent the colour of the pigment

Refractive Index:

The covering power of a pigment also depends upon its optical density, which can be represented by its refractive index.

Fastness:

Pigment must be fast to light, heat smoke, dust, and different gases present in the atmosphere common organic solvents.

Compatibility:

If the pigment particles are not chemically inert, they may precipitate out many ingredients from the binder solution into which the pigment is dispersed. A good pigment should be compatible, i.e. it should satisfactorily tolerate all the materials used in paint preparation.

Flocculation:

A good pigment power should completely disperse when it is sprinkled on stirring vehicle containing other necessary materials at slightly other necessary materials at slightly elevated temperature.

Bleeding and Migration:

Bleeding and migration of colour are another two important factors to be considered before selecting a pigment.

Abrasion:

The particles of a good pigment must show high degree of resistance to abrasion.

Crystallization:

If a pigment crystallizes out when present in dilute paint emulsion, it must be discarded as a pigment.

CLASSIFICATION OF PIGMENT:

Pigments are broadly classified into two groups: -

(1) Inorganic & (ii) Organic pigments.

Organic colour pigments are generally brighter, purer and richer in colour than their corresponding inorganic pigments. However, they are also generally more susceptible to such degrading and destructive

Influences sunlight, chemical attack and bleeding. The body, the covering power, the intensity, the light fastness etc. of inorganic are always superior than organic pigments. Considering all those factors most of the aqueous and non- aqueous paints of today are prepared by mixing inorganic and organic in required proportion.

Classification of inorganic pigments:

Inorganic pigments are two types-

- (1) True/Earth colours &
- (2) Prepared pigments.

Earth Colors

The naturally occurring insoluble colored materials come under this group. True pigments or Earth colours are found in different parts of world. Some of the true pigments based on iron oxide are listed below:

- (a) Yellow coloured iron oxide called limonite ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$).
- (b) Red colored natural iron oxide (Fe_2O_3)
- (c) Brown colored limonite contain carbon and MnO_2 . This pigments trade name is "Burnt Umber".

(d) The natural black coloured irons are called Magnetic (Fe_3O_4).

(e) Through the body, converting power, light head and chemical fastness of earth colors are better than prepared pigments, their uses in pigment preparation have reduced considerably because those ores are always associated with other materials as impurities. It is highly expensive to purify those ores, but unless those are purified standard colour can be obtained.

Prepared pigments:

The inorganic pigments which manufactured in chemical factories are called "Prepared Pigments" or "Synthetic Inorganic Pigments". Those pigments are classified into three groups:

- (a) White prime or White hiding or White pigments.
- (b) Extender or Filler pigments and
- (c) Colour inorganic pigments.

(a) White pigments

The materials, which have high refractive indices (above 2.0) and produce perfect white pigments, are allowed in this group. Example:

- (i) Titanium dioxide (C 1 -77891: Pigment white 6)
- (ii) Zinc oxide (C 1-77947: Pigment white 4)
- (iii) Lithopone (C 177115: Pigment white 5)
- (iv) Basic carbonate white lead (C 1-77597: Pigment white 10)

- (v) Antimony trioxide (C 1-77052: Pigment white 110)

(b) Extender

The extenders are also inorganic white or colorless prepared materials but they cannot produce white colour to the paints as their refractive indices near about 1.5.

Example:

- (i) Light alumina hydrate
- (ii) Kaolin
- (iii) Precipitated chalks and Silica
- (iv) Talc
- (v) Asbestos
- (vi) Mica barium sulphate
- (vii) Aluminium oxide etc. come under this group, extenders.

c) Colour inorganic Pigments

Those are also synthetically prepared colored inorganic compounds of high density and hardness. The materials given bellow can produce color to paints.

Example:

- (i) Different colored oxide of iron & chromium
- (ii) Ultramarine
- (iii) Red lead
- (iv) Colored compounds of different metals
- (v) Dust of different metals etc.

Classification of organic pigments:

According to U.S Tariff Commission the organic pigments should be classified into two groups (1) Toners & (2) Lakes.

Toners

Toners are metal chelates formed from water-soluble anionic dyes and are available in scarlet to maroon shades. Toners generally have good resistance to bleeding. Example:

- (i) Barium toners
- (ii) Strontium toners
- (iii) Calcium toners
- (iv) Manganese
- (v) Copper toners etc.

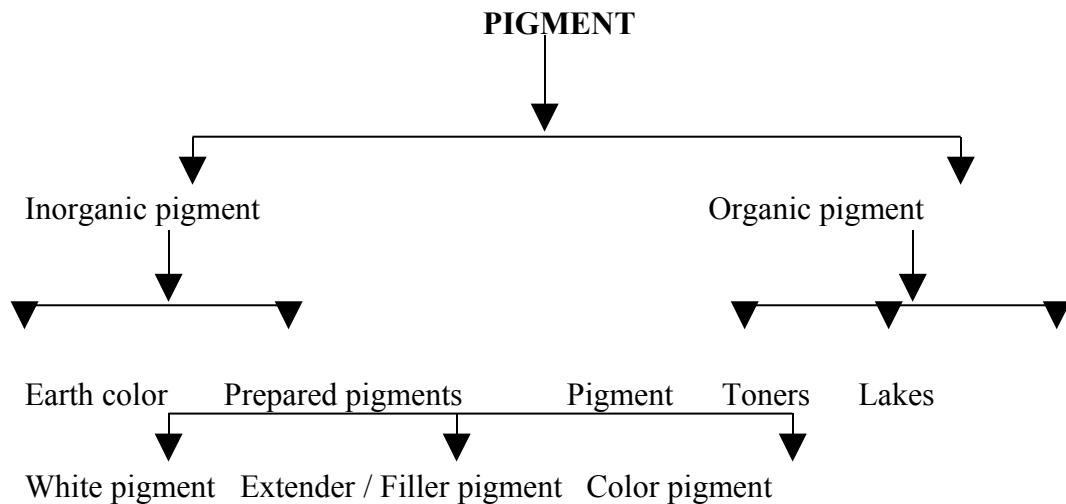
Lakes

A lake on the other hand is an organic colouring matter that has been more or less definitely combined with some inorganic substrate or carrier. The classification of organic pigments in Europe and Great Britain differs slightly from American classification. In Europe organic pigments are classified into three distinct groups as mentioned below:

- (1) Pigments Dyestuffs,
- (2) Toner Pigments &
- (3) Lakes.

It is thus clear that the American classification and Europe classification of organic pigments are basically the same except that L.S toners represent both pigments dyestuffs and toners of Europe. In India the British specification is

generally followed and therefore in the following specification chart system has been expressed.



PIGMENT IN LEATHER FINISHING:

Coloring substances are the base materials for leather finishes. A pigment is any particulate matter this is insoluble in, and essentially and chemically unaffected by the media into which it is dispersed.

The light fastness of selected is either than that of soluble dyes. This is especially apparent on pale finishes for which only small amounts of coloring substance of applied. Another effect, the transparent organic pigments too are superior to soluble dyes in this respect. With pigments it is therefore also possible to achieve a uniform coloring even of leather with unsettled surface appearance and cloudy shades so that the cutting value is improved. In contrast to soluble dyes, most of the pigments do not have the tendency to bleeding when they brought in which water or solvents, furthermore, pigments have the advantage they can be fixed during the production of the leather and large batched of leather can be uniformly produced and stored.

The pigments of course do not have only advantage. In addition, they are not fixed to the direct but the anchored to the leather surface by means of suitable binders. Therefore, any use of pigments means that the leather surface to the behavior of the leather and to wearing properties for the processing and the use intended as efficiently as possible.

Coloring substances of various origins are used as pigments for leather finishes. There are essentially two main groups, inorganic and organic pigments. Both group are manufactured synthetically so that pureness specific shades, fastness properties and are ensured.

Inorganic pigments (e.g. titanium white, zinc white, cadmium yellow and red chrome yellow and orange, iron oxide, yellow red brown and black, molybdate orange and red and red) generally have covering power. They are, however, less brilliant and process less tinctorial strength than organic pigments (e.g. yellow, orange, red, blue, and green types). The range of finishes therefore, usually contain members with inorganic and others with brilliant colors and obtain specific shades, organic and pigments are used together on the finish.

The pigments cannot be used for leather finishing in the form in which they are produced. In order to render them really embeddable in binders, they are use in from of pigment preparation in which they are uniformly and finely dispersed. The finishing effect is decisively dependent on this from of dispersion. Thus, leather finishes are always pigment preparation in which the pigments are dispersed by a treatment, which involves a great deal of work and rubbed off. The finishing agents should level out the appearance of the leather on the whole surface as much as possible and should either remain transparent or cover up the surface entirely. The requirements may lie in any graduation between the two extremes.

Properties of the pigments:

Any surface coating pigments may be asked to carry out some for perhaps all of the following tasks:

- (i) To provide color,
- (ii) To obliterate color,
- (iii) To improve the strength of part film,
- (iv) To improve the adhesion of the paint film,
- (v) To improve the durability and weathering properties.
- (vi) To reduce gloss.
- (vii) To modify flow and application properties.

To choose pigments to carry out a given selection of those seven functions, we must know about the following properties of the pigment.

- i) Tinting strength.
- (ii) Light fastness.
- (iii) Bleeding characteristics.
- (iv) Hiding power.
- (v) Refraction index.
- (vi) Particle size.
- (vii) Particle shape.
- (viii) Specific gravity.
- (ix) Chemical reactivity.
- (x) Thermal stability.

CHAPTER 6

FINISHING OF LEATHER

The surface of leather or the grain was treated in ancient times with a protective season. The modern finishing however has been developed in the last thirty years to a high performance technology with respect to the chemical composition and to the methods of application.

Generally 'Finishing' is defined as the up gradation or treatment of the leather surface with finishes and season to impart the special properties desired of leather as commercial product.

FINISHING MAY IMPROVE THE QUALITIES OF LEATHER IN SO FAR AS:

- a) Levelness of color on the skin.
- b) Uniformity of shade from skin to skin and pack to pack.
- c) Changing the color to that, which is required.
- d) Imparting color or pattern to un-dyed leather.
- e) Adding a transparent film through which the natural appearance of the leather may be viewed.
- f) Adding a transparent color film to the leather.
- g) Covering the leather with an opaque film in order to obliterate all defects.
- h) After the surface of the materials splits.
- i) Improve the scuff resistance of the leather.
- j) Improve the water resistance of the leather, i.e. the finish should not discolor or swell and hence protect the leather and retain its good appearance.

- k) Give a leather of optimum cutting value.
- l) Seal the leather surface so that it remains clean.
- m) Render the leather light fast.
- n) Render the leather head fast.
- o) Render the leather fast to alkalis.
- p) Render the leather fast to acids.
- q) Render the leather resistance to a light pull up on lasting.

**FINISHING WHICH BEST OF THESE QUALITIES TO LEATHERS
MUST THEMSELVES HAVE THE QUALITIES OF:**

- 1) Remaining in its original condition of gloss or matt for long periods.
- 2) Not make a film on the leather, which is too plastic like in appearance.
- 3) Not spoil the feel or handle of the leather.
- 4) The finish should not craze or be easily removed.
- 5) It should be resistant to the adhesives used in the manufacture of leather goods i.e. solvents adhesives.
- 6) It must adhere to the leather in damp or wet conditions e.g. moulded leather skin boots and gloves etc.
- 7) It should resist dry cleaning fluids.
- 8) Resist heat and not tack.
- 9) Have resistance to cold crack.

10) Allow the leather to be washed.

11) The finish should not take up color from nearby articles or impart color to it.

It will be concluded that all leathers do not require all the above properties and it must be stressed that all the above properties can not be achieved the use of one finish only.

The number of coats of finish applied to a leather and the way in which they are applied is very important sometimes more important than the actual constituents of the finish. Most leather should be dyed a slightly darker shade than that they are intended to be finished.

PROPERTIES OF THE FINISH FILM:

An ideal finish film of the leather must deserve the following properties:

- Excellent flexibility and stretchiness
- Good adhesion
- Good holding power
- Fine glossing property.
- Abrasive resistance and fastness
- Waterproofness and water vapor permeability

CHARACTERISTICS OF AN IDEAL FINISH FILM:**FLEXIBILITY AND STRETCHINESS:**

Leather is a flexible material with certain degree of stretchiness. If the films to the leather surface dose not possess these properties to the same extent as leather, it will make the leather hard and the film will crack in course of time.

ADHESION:

The film should be firmly fixed to the leather surface so that the formal does not come out during use. The film should also adhere to the pigment particles and others very firmly.

HOLDING POWER:

The film should have sufficient capacity to hold in it other substances like pigment, plasticizer etc. During drying or film formation no ingredient of the finish should precipitate out. The ideal film will never allow the plasticizer to migrate into the leather.

GLOSS:

The film should glaze by itself or should acquire this quality after glazing machine or hot plating or brushing.

ABRASIVE RESISTANCE AND FASTNESS:

The film should have sufficient resistance to abrasion for longer life and at the same time, it should hold the coloring materials so tightly that it dose not come out when rubbed with a dry or wet cloth.

WATER PROOFNESS AND WATER VAPOR PERMEABILITY:

The film should repel water so that it does not spoil the leathery appearance of the finished leather at the same time, the film should hide all the defects in the leather.

THICKNESS:

The film should be as thin as possible so that it does not spoil the leathery appearance of the finished leather at all but at the same time, the film should hide all the defects in the leather.

RESISTANCE TO ACID, ALKALI AND CHEMICALS:

During use the leather comes in contact with dirt, mud, acid and alkali fumes, sweat etc. this is especially true for leathers used by army in the field. The film on the leather should have therefore, sufficient capacity to protect the leather from these.

THEORY OF FINISH FILM FORMATION

Season, containing film forming materials with other ingredients is applied on the leather surface in the liquid state and its dilution is so adjusted that sufficient time is available of uniform spreading of the season on the leather surface by hand or machine and setting of pigment particles before solvent goes out by evaporation. As evaporation of volatile matters (solvent) continues, the solid content of the season increases with gradual decrease in film thickness till a constant thickness, which again depends on the concentration of non-volatile matters in the season is reached and after which no decrease in thickness is noticed event though evaporation conditions. The molecules of the film forming materials present thus approach each other and since the inter molecular forces, called vander walls is forces are inversely proportional to the sixty powder of the distances between molecules, the force of attraction increases very rapidly with the decrease of molecular distance.

Many practical tanners have the wrong impression that as these molecules comes close to the nearest approach they chemically react (polymerize) and from the film. But this is true when polyurethane linseed mucilage etc. are used for parent leather finishing but which other materials like casein, shellac, acrylic or met acrylic resin, synthetic rubbers based on butadiene, vinyl resins, nitrocellulose lacquers etc. no such chemical reactions take place during film formation. The molecules in such films remain together due to vander walls force of attraction, which is also called residual valence or secondary valence forces. In the liquid or solid state the term internal pressure is also applied. The tensile strength flexibility, water resistance and practically all other physical properties of film naturally depend to a large extent on the strength of this secondary valance force. What is secondary valance force then? This is the force, which keeps the molecules in matters together just like the atoms in molecules remain together by the influence of primary valance force. The forces due to ionic, covalent, co-ordinate, metallic bonds and resonance in the molecules are the primary valance forces or inter know as vander walls forces are the secondary valance force Hydrogen bonding is a so kind of secondary valance.

The secondary valance forces are actually due to residual fields left about the molecules as a how after two or more atoms have combined together to a from a molecule through primary valance force. When electrons are transferred from one atom to another, as is in round in ionic bonds to forma molecule, the latter becomes a dipole with permanent dipole moment. Similarly when a molecule with dissimilar atoms is formed through co-violent bonds the canters of actions negative charges. The whole system thus will show a dipole moment. The same rule can be attributed when molecules are formed from atomic stages through other types of bonds.

In molecules there may be several dipoles but the overall dipole moment of the molecules is the resultant of 11 the dipole moments is it. For simplicity let us consider two different arrangements of equal and opposite charges at the corners of a square as shown in figure A and B-

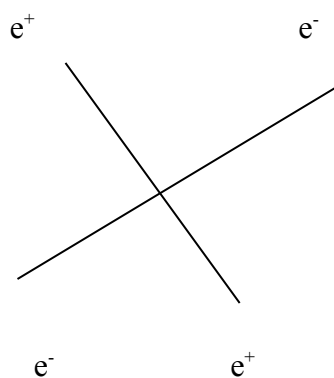


Fig-A

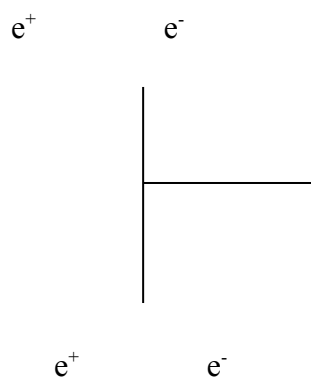


Fig-B

In fig-A the canters of action of both the positive and negative charges are at the point "0" and therefore the dipole moment in zero. But in fig-B the canters of action of both the positive and negative charges are L and M respectively. The whole system electrically is thus a rod LM of length S. one end of which is

negatively charge which an intensity $2e$ and the other end positively which the same intensity. The molecules with definite dipole moments are called polar molecules where as no polar molecules have no dipole moments.

Of course, dipoles moments can be induced on many polar molecules are separated from each other; the leathers become no the polar again. This is induction effect.

There is another effect called the dispersion effect by which no polar molecules may gain polarity. This type of secondary valance force Aries from the temporary relative displacements of the nuclei and electrons during the vibration of several parts of molecule with repeat to one another.

During film formation the dipoles rotate. If necessary and finally arrange themselves in ant parallel arrangements as shown below-

- Polar molecule
- Intermolecular space
- This is called orientation effect.

Thermal agitation always tends to upset these alignments, so that this type of secondary valance force is highly depended upon temperature. In a film, both attractive forces between similar poles play their roles side by side, no doubt but due to orientation effect the average distances between similar poles and therefore overall resultant force is the attractive force, if on the other hand the resultant force was repulsive, the molecules would behave like a perfect of forming any film.

LEATHER FINISHING SYSTEM

In general, the finishing of leather is done by application of the finishing materials in three layers, which can be termed as (i) Ground or bottom layer, (ii) top or final layer. The functions of these three layers are quite different and as follows-

(i) Ground or bottom layer of Base Coat:

This layer would form the foundation of the finish and control many of the key properties including adhesion, flexibility, filling and tightness of the grain, concerning of the leather surface defects and general uniformity.

Generally, solution of a suitable film forming material, which may or may not be colored with both dyestuffs and pigments, is used. The solution used for the bottom layer should have low acidity or alkalinity with P^H values within 6 to 7. The main objects for the successive intermediate and top layers are to provide better adhesions between leather surface and the intermediate layer.

(ii) Intermediate or Middle layer:

This is the layer just above the ground coat and it represents the major portion of the film thickness. The film forming materials used in the intermediate layer should have strong affinity for pigment particles, materials used in ground coats. In protein-finished leather, the casein of the base coat is modified by the addition of albumins, which in resin finishing a harder resin or resin mixture is used.

(iii) Top layer:

The main objects of this layer are:

- i) To give required degree of gloss.
- ii) To protect the middle layer from scratch, frictional damages and abrasion and also from other damages due to sweat, acids, alkalis and other injurious materials.
- iii) To make the finish film waterproof, and

- iv) To produce very good feel and attractive appearance. The materials used for top must be very hard to make the leather smooth after planting, better resilient and round when bent with grain side out.

The technique of finishing leather differs from tannery to tannery, country to country. In many tanneries top coat is not applied separately and they use more binders in the season for the middle coat. The seasoning coat is generally applied by hand spray after the middle coat, but some times it is often on clear cut difference between the before mentioned various coats and amalgamation of various coats is being wide used now-a-days for ease of application and saving in time.

TYPES OF LEATHER FINISHIES

These are three different types of leather finishes which are commonly used by leather finishers. They are:

- 1) Water type finishes.
- 2) Solvent type finishes.
- 3) Emulsion type finishes.

1) Water type finishes:

This may be based on pigment, protection binders, such as casein, shellac, gelatin, egg, and blood albumin, waxes and mucilaginous substances like decoration of linseed. These finishes are mainly used for glazed finishers, which are required to be glazed by glazing machine.

The binders in the finish are intended to hold the pigments or dyes in suspension and bound firmly on the leather surface. Softness, glazing properties and 'handle' are contributed by water soluble plasticizers, waxes and mucilaginous matters.

Recently water type finishes based on pigment or dyes and resin dispersion are increasingly used to achieve especial effect on the finished leather. The use such

finishes produced may improvement over the conventional protein based finishes such as better adhesion and flexibility of the finish, improved filling and sealing properties and greater uniformity of the flesh.

2) Solvent type Finishes:

In contrast to water type finishes solvent-based finishes contain as a binder polyurethane or collodion (Nitro-cellulose). These finishes are dissolved in organic solvents such as butyl acetate, cyclohexanone, etc. These finishes are widely used for finishing based on vinyl resin instead of nitro cellulose have shown improved resistance to flexing and better flexibility at low temperature. They have been successfully used on upholstery leather, case leather, case leather and certain military where low temperature flexibility is necessary.

3) Emulsion type finishes:

Emulsion type finishes consist of nitrocellulose or resins. Such emulsions are being widely used to confer to confer combining properties of water and lacquer finish. Latex emulsion top coat for upper, garment and glove leather are gaining wide acceptance.

FILM FORMING / COATING TECHNOLOGY:

The coating applied in leather technology may be divided into four broad classifications:

1. Lacquer systems
2. Drying oil systems
3. Condensations systems and
4. Latex systems

Leather finishing, as applied in practical methods, may be the result of several of these coating systems. The systems differ from one another in their mechanism of film formation and in the chemical nature of materials involved.

Lacquer systems:

The formation of a film in a lacquer system is the evaporation of the solvent containing a film-forming material. A simple example of this is the dissolving of shellac in alcohol and applying this to a surface, nitro cellulose dissolved in an organic solvent is also an example of this type of coating. This type of high-gloss lacquer is commonly used in household decorative enamels.

Drying oil Systems:

The second basic group of film-forming materials is the drying oils. Into this classification fall the nature drying oil, such as linseed and tung and also any material which will undergo polymerization, upon drying. This is different from a lacquer in that the setting up of the film is not simply a deposition of a high molecular weight material; rather it is chemical reaction- taking place between the dissolved film forming material and atmospheric oxygen. In the drying oils the film forming materials (a binder) is an organic chemical having a high degree of instauration. As the oil absorbs oxygen from the air, the unsaturated material is

oxidized and reactive portions of the fatty acid molecule develop which can then polymerize with other fat molecules to form a continuous film on the surface.

Condensations systems:

In condensation systems the formation of the film is due to a chemical reaction between the various components of the finish after application. The reaction may form a plastic or polymer in water between two molecules. Such systems are usually heat-activated and may be baked, glazed, or hot pressed. Condensation of polymerization is used in the leather industry through protein-aldehyde reactions and with other resin systems. In this kind of finish the reactive components are usually mixed shortly before application, due to the limited pot life of the components.

Latex systems:

In a latex system the binder is emulsified water, when the latex is applied, the water evaporates, or sinks into the leather, and eventually a phase inversion takes place. A continuous layer of the binder spreads, on the surface of the material being coated and becomes a continuous film. Latex systems have their advantage in easy of application. The flammability and toxicity of organic solvents are largely avoided; the film can be diluted with water, enabling thin films to be applied

Through modern techniques for forming co-polymers, a wide variety of different lattices can be made which have a broad spectrum of properties. The versatility, low cost and ease of application of such systems have led to their wide spread use in the leather industry. The latex system and dispersions of resins in an emulsion form are by far the largest and most widely used method of preparation in leather finishes today.

CLASSIFICATION OF FINISHIES:

According to the finishing materials:

- 1) Casein Finish
- 2) Resin binder or polymer finish
- 3) Nitro-cellulose finish
- 4) Polyurethane finish

According to the finishing technique:

- 1) Glazed finish
- 2) Glazed/ plate finish
- 3) Plate finish
- 4) Embossed finish
- 5) Spray finish
- 6) Curtain coating finish

According to the finishing effect:

- 1) Aniline finish
- 2) Semi-aniline finish
- 3) Opaque finish
- 4) Easy care finish
- 5) Antique finish
- 6) Fancy finish
- 7) Two-tone finish

CHAPTER 7

PROCEDURE (PROCESS INFORMATION)

Name of Operation % of Chemicals use Time Analytical Checking

Pre-Soaking:

300 %	Water at N.T.	
0.2 %	Soda Ash	
0.2 %	Wetting agent (LD-600)	Run-20'

Howling 20 minuets,
Keep in the bath for 1 hour. Drain.

Main-Soaking:

300 %	Water at N.T.	
0.4 %	Soda Ash	
0.3 %	Wetting agent (LD-600/NI-extra)	
0.2 %	Preservatives (Busan-40L/Aracite-DA)	
		Run-30' P^H=9.0-9.5

Leave Overnight in the bath, Next day washes well and Drain.

Liming: (in bowl/ drums/paddles)

300 %	Water at N.T.	
4.0 %	Lime	
3.0 %	Sodium Sulfide	
1.0 %	Liming Auxiliary (Erhavit MB/ Colapel-DL)	
0.3 %	Wetting agent (LD-600/Lisapol)	
0.2 %	Preservatives (Busan-40L/Aracite-DA)	

Run for 30 minutes. **P^H=12.5-13.0**

Leave in the bath for 2-3 days with regular hauling.
Then scudding by hand very well.

Fleshing:

Fleshing is done by fleshing machine. Then pelt weight is taken,

(All % based on this pelt weight).

Name of Operat % of Chemicals use Time Analytical Checking

Chemical Wash: (in Drum)

200 %	Water at N.T.	
0.25 %	Meta Bi-Sulfite	Run-20'

Deliming:

100 %	Water at N.T.	
1.5 %	Ammonium Sulphate	
1.5 %	Ammonium Chloride	
0.5 %	Meta bi-sulfite	Run-60'

Check: Cross-section with Phenolphthalein. **Colorless.** **P^H=8.0-8.5**

Bating:

(Add to the same bath)

Temperature was adjusted at 37°C

1.0 %	Bating agent (EG-98)	
0.5 %	Wetting agent(LD-600/Lisapol)	Run-60'

Check: Bubble test.

Then scudding by hand knife and wash well with lattice door until clear water come out.

Pickling: (in Drum)

80 %	Water at N.T.	
8.0 %	Salt	Run-15'
+0.5 %	Formic acid (1:10 dilution)	Run-30'
+0.2 %	Imrapel CO	Run-15'

Rechroming:

100%	water at NT	
+ 8%	Chrome	
0.5%	Sod. Formate	
		Run for 60min
+		
1.5%	Glutaraldehyde	Run for 30min
+		
1.5%	Remsol OCS	Run for 30min
+		
1.5%	Relugan RF	Run for 30min
+		
1%	Sodium formate	Run for 90min

Check P^H 3.9-4.0

Neutralisation :

150%	Water at NT	
2.5%	Neutral syntan(Sellazol NG)	
1.0%	Sod. Formate	
		Run for 30min
+		
0.3%	Sodiumbicarbonate	Run for 30min

Cheack P^H --- 4.8-5.0

Washing with 300% water for 10 min.

Retanning:

100%	water at 45°	
4%	Relugan RE	Run for 30min
1.5%	Lipoderm liquor(SN)	Run for 30min
+		
4%	Tanigan OS/PAX	
3%	Mimosa	
4%	Neosyn HL	
		Run for 90 min
+ 0.5%	HCOOH	Run for 30min

Dyeing:

100%	water	
1.0%	Dye levler	Run for 30min
3.0%	Dye	Run for 30min
	Check penetration	
50%	water at 60°c	wash for 10 min.
1%	HCOOH	Run for 30min

Fatliquoring:

100%	Hot water at 60°c	
+		
3%	Remsol B40	
4%	Remsol C ₂	
1%	Lipoderm liquor IC	
1%	Synthol O	
		Run for 60 min
	+	
2% HCOOH		Run for(10+30)min

+
1% Cationic fat Run for 30min

Next morning,

Setting: Setting is done Setting Machine.

Vacuum Drying: Vacuum dry at 50' for 1 min.

Hang to dry: For two days.

Toggling: Dry in toggle dryer with maximum tension.

Staking: Staking is done by Vibration Staking Machine.

Trimming: It is done to reduce unnecessary parts of leather.

Kiss-Plating: It is done by Roto-Press Machine at 70°C / 75 kg pressure.

Then it was ready for finishing.

FINISHING:**Base Coat:**

Ground UP	100 parts
Water	100 parts
Cationic pigment	10 parts
Melio Fetgriff SZ	10 parts
Melio OF 5216	2 parts

1X Spray, Plane plate at 80⁰ C/50 lb/1 sec.

Season Coat:

P.P Extra Pigment	30 parts
Melio OF 5216	5 parts
Melio Fetgriff SZ	20 parts
Melio Wax AL02	50 parts
Melio Resin 776	60 parts
Melio Promol 54A	40 parts
Melio Resin 820	30 parts
Water	400 parts

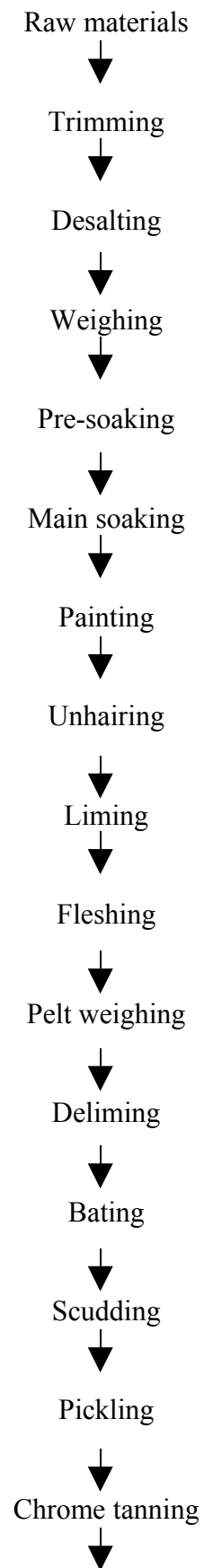
Spray 2X, Fine hair cell at 85⁰ C/100 lb.

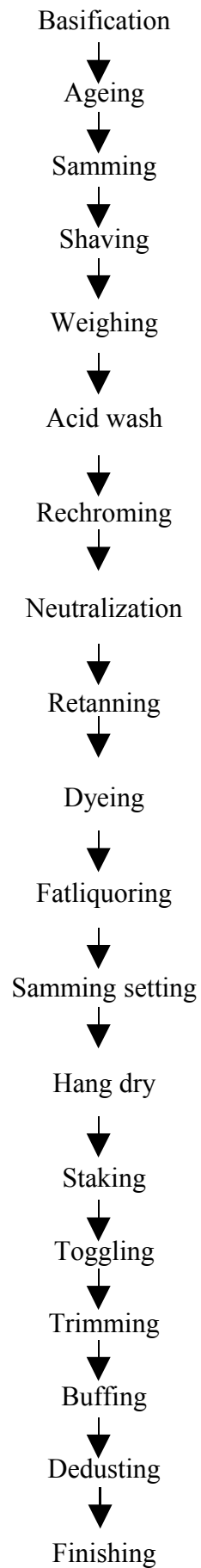
Again 2X spray.

Top Coat:

Melio EW346	200 parts
Water	200 parts
Ultra metallic copper	30 parts
Aqualen AKU	5 parts

Spray 2X, roto press at 100⁰ C/50 lb/ normal speed.

FLOW CHART OF WORKING



CHAPTER 8

PHYSICAL TESTING METHODS

The finished leather samples under the experiments were tested for their various physical properties. These properties indicate about the quality of the finished leathers produced. Due to limitations of time and the availability of instruments, selected physical tests were accomplished and these tests are briefly discussed here.

MEASUREMENT OF TENSILE STRENGTH AND PERCENTAGE ELONGATION AT BREAK

The tensile strength and elongation at break was measured by electronic tensio meter. The process was followed by official method of analysis (1965), Ref./ 4(c)4(d)2, SLP-6, IUP/16.

a) Tensile strength:

Tensile strength is the force (Kg) per unit area of cross section (sq. cm) required to cause a rupture of the test specimen.

So, tensile strength of the specimen was calculated using following formula.

$$\text{Tensile strength} = \frac{\text{Breaking load (Kg)}}{\text{Thickness (cm) x Width}}$$

b) Percentage elongation at break:

Elongation at break for these specimens was calculated from the distance of the jaws after breaking was occurred.

$$\% \text{ Elongation at break} = \frac{\text{Distance increased by breaking}}{\text{Distance of the two jaws in normal}} \times 100$$

MEASUREMENT OF STITCH TEAR STRENGTH

The double holes stitch tear strength can be defined as the load (Kg) required tearing the sample of the leather between two holes of 2mm. diameter each and whose centers are 6mm apart, expressed on its unit thickness (cm). So, stitch tear strength of the specimen was calculated by the following formula:

$$\text{Stitch tear strength, Kg/cm} = \frac{\text{Tearing load in Kg}}{\text{Thickness in cm}}$$

The sampling for this test was carried out in both parallel and perpendicular directions to the backbone and the test specimen was a rectangular piece of size: - 50 mm x 25 mm.

MEASUREMENT OF TEARING STRENGTH

The tearing strength of leather can be defined as the load in Kg required tearing the leather sample if its thickness was one centimeter.

$$\text{Thus, tearing strength, Kg/cm} = \frac{\text{Tearing load (Kg)}}{\text{Leather thickness (cm)}}$$

For this test also the sampling is done both parallel and perpendicular to the backbone and the mean thickness of the test specimen is determined. A slot or a straight cut of 20 mm length is made on the leather test sample of dimension (50 x 25)mm.

TESTS FOR DRY AND WET RUB FASTNESS

The tests were carried out by official's method analysis SLF 5. This is a very useful test for finished leather. A revolving pad is made to rub the leather for a successive number of revolutions and the effects of such rubbing under both the wet and dry conditions are studied using a Grey scale. While a 2.5 kg load is used for dry rubbing a 730 g load used for wet rubbing.

The numbers of revolutions for wet rub fastness are 32, 64, 128, 256, and 1024. Every time a fresh surface of the leather is used for rubbing. For dry rub fastness test the number of revolutions are 32, 64, 128, 256, 512 and 1024. The number of revolutions required causing a contrast of grade 1 (if this is 1024 or less) and the contrast grading often 1024 revolutions are found out and a description of the nature such change is record.

TESTS FOR COLOUR FASTNESS OF LEATHER TO PERSPIRATION: SLF 426 (IUA 426)

By fastness of colour of leather to perspiration is meant its resistance to the action of human perspiration.

A piece of specified undyed textile, witted with artificial perspiration, is placed on the side of the specimen to be tested. The specimen is also wetted with artificial perspiration. The composite specimen is then left under pressure for a specific time in an appropriate apparatus. The specimen and the staining of the textile or assessed with standard Grey scale.

TECHNICAL INFORMATION ABOUT CHEMICALS USED FOR THE COMPLETION OF THE PROJECT:

- 1. LD- 600** : Wetting agent, Charge: Non -ionic.
(BASF, Germany)
- 2. Busan 40L** : Bactericide for leather tanning
(Buckman, USA)
- 3. Busan 30L** : Fungicide for leather tanning
(Buckman, USA)
- 4. Mollescal BW** : Soaking auxiliary. (BASF, Germany)
- 5. Erhavit MB** : Sulphide free liming auxiliary.
P^H value: 9-11 -0 (TFL, Germany)
- 6. Mollescal MF** : Amine and Sulphide free liming auxiliary.
(BASF, Germany)
- 7. Bate EG- 98** : Bate powder (Hodgson, England)
- 8. Chromitan B** : 33% Basic chromium sulphate
BASF
- 9. Neosyn RW** : Cresylic multipurpose replacement syntan,
Total solids: 92% , P^H (2% solution): 4.0-5.5
(Hodgson, England).
- 10. Neosyn BS3** : Naphthalene based neutralizing syntan
Total solids: 94% pH (2% solution):7.0- 8.0,
(Hodgson, England).
- 11. Relgan RE** : Acrylic copolymer, Charge: anionic.
P^H: 6.5. Active substance: 40%
(BASF, Germany).

- 12. Paramel P-100** : Amino resin, Total solids: 94%
P^H (10% solution): 8.5-9.7.
(Hodgson, England).
- 13. Tanigan OS** : Replacement tanning materials.
Concentration: 96-98%
P^H (10% solution):3.5
(Bayer, Germany).
- 14. Neosyn N** : Naphthalene auxiliary dye leveling Syntan.
Total solids: 92% P^H (2% solution): 6.5-8.5
(Hodgson, England.)
- 15. Trisul ML** : Sulphited stabilized fatliquor based on oxidizing
marine oil. Active content: 80 %,
P^H (2% solution): 5.0-6.0
(Hodgson, England.)
- 16. Paramal PA** : Acrylic Resin Binder (Clariant)
- 17. Quebracho** : Vegetable Extract . (ATO)
- 18. Mimosa** : Vegetable Extract, P^H (10% solution):4.4-4.5
- 19. Synthol O** : Synthetic oil, Active matter: 100%,
Clear yellow oil, (Smith & John).
- 20. Remsol B40** : Sulphited natural/synthetic oils. Anionic,
Active matter: 70 %, (Hodgson, England).
- 21. Remsol C2** : Stabilized synthetic fatliquor. Anionic,
Active matter: 50 %, P^H (2% solution):7.0-8.0
(Hodgson, England).

22. Melio Resin A-820

Solids content	:	approx. 24,0 %
pH value	:	approx. 8,5

Composition:

Melio Resin A-820 is a compact binder based on selected polymers and filling agents. (Clariant)

23. Melio Resin A-776

Solids content	:	approx. 22,0 %
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pH value : approx. 8,5

Composition:

Melio Resin A-Impregnation and adhesion binder
(Clariant)

24. Melio Promul 54.A

Solids content : approx. 20,0 %

pH value : approx. 8,5

Composition:

Melio promul 54. A-is a adhesion binder
(Clariant)

25. Melio EW-348.B

Solids content : approx. 17,0 %

pH value : approx. 8,5

Composition:

Melio EW-348 NC-emulsion lacquer, multiple use
(Clariant)

CHAPTER 9

CONCLUSION & RECOMMENDATION

Modern worldwide leather market is now a days very fond of bag leather. Finished leather is also an intermediate product. Which serves as a raw material for finished leather is therefore, fashion driven, requiring more responsiveness to the market, whereas crust leather is more a commodity type product. Bangladesh currently exports leather bags to Europe and Japan.

As production capacity in finished leather and leather goods is developed in Bangladesh, new jobs will be acquired, and markets will be accessed. But in our country's cow hide quality is not good for many reasons, but the lower grade raw stock can be upgraded to a higher level by using different tanning and finishing techniques.

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