

CUTTING TECHNOLOGY

Proper handling of cutting tools and equipment

A good craftsman will store his tools in a safe place. This will prevent damage to the tools when not in use and help to keep them in a first class condition. Always cover sharp tools with a sheath made of leather or fabric

Cutting Techniques

Your material and technique

- The best part of the leather is used for cutting the greater proportion of large parts (patterns).
- Start to cut smaller parts after large parts are completed.
- Place several patterns on to the leather at the same time to get the best combination (reduce waste)
- Always plan two or three cuts ahead. Never cut without knowing where the next pattern will be placed.
- Always start cutting at the butt part of the leather and proceed along the backbone to the outward direction as much as the quality and substance of leather is suitable
- If you are cutting skin leather, start also at the butt and continue towards each side from the backbone to the shank until you reach the neck.
- If you find defects near the backbone, start cutting as close as possible to the defected portion and proceed towards the direction from the backbone to shank.

Leather sorting

Leather before cutting will depend on the producer requirement according to the requirement according the required product quality and the type of leather needed for the design of the material

Storing of leather

While storing leather keep hide flat rather than rolled up. A wooden horse 1 meter wide and 1.25 meters height should be suitable to accommodate even largest hides. Hanging the leather by this method for some time will often help to remove creases that have been formed when the leather was bundled. Grain leathers can be rolled up, grain side outwards with the neck to the center, with final skin rolled with the grain surface on the inside. Wrapping brown paper particularly for vegetable tanned leather is recommended. Split leather is best if kept flat.

Synthetics, fabrics, reinforcements and wadding materials are available in roles and are easy for storage

Bundling

Bundling is the process of disassembling the stacked and cut pieces and reassembling them in production lots grouped accordingly

Characteristics of leathers

Each type of leather is suited to a range of uses, according to its unique characteristics choosing the right one for the job is easy, once you know what to look for. Leather is tanned and finished on the grain side to have a smooth rich surface. Leather, which is tanned and finished on the flesh side, is called suede.

LEATHER GRADING

PRINCIPLES & CONCEPT OF LEATHR GRADING

Introduction

Leather grading is the process of sorting out of finished leather into different groups e.g. A, B, C or I, II, III etc., as per the quality and cutting value. Cutting value is defined as the % usable area i.e. the % area of leather which is free of any defect.

In other words

$$\text{Cutting value (C.V.)} = 100 - \% \text{ defective area}$$

$$\% \text{ defective area} = (\text{Total defective area} / \text{area of leather}) \times 100.$$

Example 4.1

Net detective area = 5 sdm,

Leather area = 110 sdm.

$$\therefore \text{Defective area} = \frac{5}{110} \times 100 = \frac{50}{11} = 4.54\%$$

$$\therefore \text{Cutting volume } (100 - 4.5) \% = 95.5\%$$

Upper leather varies in nature; no two skins are the same. Because of this a method of sorting for cutting value is recommended. Skin of similar cutting value can be group together and allocated a grade or point value e.g. the skin of cutting value between 100 to 97% are grouped in grade A Or 1. Similarly skims of cutting value between 96% to 92% are grouped in grade B or 2 etc. Each tanner has his own standards. Some tanners grade by A.B.C. etc. and some by 1.2.3. etc.

1. Objective of grading

Leather Grading: is allocating different type of leather into different group as per the quality and cuttable area of leather.

The purpose of leather grading can be dividing into two areas:

1. Financial implications, and
2. Quality implications.

Financial Implications

By this we are establishing whether the company has brought the consignment of leather at correct price or not i.e. if the company has paid 20,000/- birr for purchasing 500 sq.ft of leather whether they have received the material worth 60,000 or not.

Quality Implications

This is the grading of the leather into various grades to allow the cutting room to issue certain grades of leather for certain styles.

Examples: Ladies single cut court shoe would be cut from 1st and 2nd grade leather whereas Ladies strap sandal could be cut from 3rd and 4th grade.

In strap sandals we can utilize the defective area of leather too in certain portion. We can also establish true profit and loss figure's for each clicker.

This will be discussed in detail in cutting corrected grain.

2. Percentage of defects

Calculation of Cutting Value and percentage of defects

As we have seen earlier, the cutting value is calculated as a percentage on 1st grade skin we have an allowance of up to 3% defected area.

The following table shows the various grading allowances. (Note: This will be discussed in detail in cutting technique handout).

The grades after 1st grade all vary by 5%.

Grade	Cutting Value	%Wastage(defects)
A or 1	100% to 97%	Upto 3%

B or 2	96% to 92%	8%
C or 3	91% to 87%	13%
D or 4	86% to 82%	18%
E or 5	81% to 77%	23% etc.

3. Units of measurements

The common units of leather measurement in footwear factories and leather manufacturing tanneries are:-

- Square feet (sq.ft): the most commonly used measuring unit as compare to the other units.
- Square decimeter(sq.dm)
- Square meter(sq.m)
- Square centimeter (sq.cm)

4. Conversions of units of measurements

As described above, the most commonly used leather measuring unit as compare to the other units in different leather measurement in footwear factories and leather manufacturing tanneries is Square feet (sq.ft).the following table shows how to convert from one leather measuring unit to the others.

1 feet = 0.3048 meter = 30.48 centimeter = 3.048 decimeter
1 Square feet (sq.ft) = 9.29 Square decimeter(sq.dm)
1 Square feet (sq.ft) = 929 Square centimeter (sq.cm)
1 Square feet (sq.ft) = 0.0929 Square meter(sq.m)

Methods of leather grading

The leather grading system employed by leather upholstery manufacturers and suppliers is used as a means of differentiating and marketing individual types of leather by price, based on quality or style. The grading system is the method manufacturers use to present their pricing structures to retail dealers. Leather suppliers also use a grading system to distinguish their leathers and prices to manufacturers. This classification works efficiently and is simple to understand within the context of each individual leather line, but problems crop up if one attempts to compare or contrast leathers from line to line or from manufacturer to manufacturer.

With lower grades typically beginning at "A" or "1", one producer's "C" may be another's "5" or "6". Problems arise because the system is far from uniform.

While some leather manufacturers, including Harry Cierler, director of U.S. marketing and sales for Chateau d'Ax, argue that standardized regulations should be instituted, others contend such standardization will never be instituted due to the segmentation within the leather industry. Since not all resources deal in splits (a lesser-quality leather covering), eight-way hand-tied construction or larger scaling, for instance, opponents argue that such inconsistencies in application forgo any ranking considerations.

"The thing about grades that makes it confusing is there is no industry standard," said Bruce Schronce, Century's manager of merchandising and product development for leather. "Everyone has a different grade. Basically each grading system serves the company's own standards. It would be too difficult to organize a standard for everyone."

Luana Davis, vice president of product development for Leather Trend, which runs four grades/four price points, agreed. "Everyone grades based on their own needs and their own price points. However now a day most tannery person's has been started leather grading by selected grade and table runner. Whereas the footwear manufacturers are commonly used grading with and without the reference of design. Additionally other might use different from the above four leather grading system.

Tannery's Method of Grading

1 Selected Grade (S.G.)

In this method the buyer orders the grade of leather required for a particular shoe style. Although the buyer has ordered a particular grade, it is still recommended that the leather be graded to check for grade variation. In this way, accurate evaluation of the price will be obtained and any price variation can be claimed from the tannery.

Remember there is no standard for tanners grading and these standards vary between tanneries. When regarding has been completed it is recommended that a price variance account be kept to monitor the gains or losses, resulting from such regarding.

1. Table run(T.R)

A table run of leather is a mixed selection of various grades. The buyer and the tannery normally agree on a price which is on the middle grade.

Example: If grade 1, 2,3,4,5 was to be accepted then the buying price they would be based on third grade. The leather received from the tannery would also be expected to contain reasonable % of all grades. When buying T. R. leather it is essential to regarded the leather into the individual grades, to assess, if the company has received value for money.

Method of Grading within Shoe Factory

2 Grading with respect to design

In this method the leather grader takes into account the design of the shoe to be cut, and grades the leather to those requirements. For example a shoe with 20 per/pair, it is profitable to cut this from a lower grade leather may be 4th grade leather as per the tanneries method of grading. But, when we issue that leather to a cutter we upgrade the leather we may issue it as 2nd grade leather as in this case the total defective (waste) area of leather is reduced since we are in a position to utilize the defective area too due to so many small components. This method is called grading with reference to design.

3 Grading Without Reference to Design

In many factories grading is done similarly to the method used in tanner's that is the leather is graded on area defects only. The design is not considered at all while doing leather grading.

The objective of leather grading

Leather grading is a process of sorting out of finished leather into different groups as per the quality and cutting value. Leather grading is done to assess the financial implications and quality implications after purchasing.

- Basically the propose and importance of grading the leathers are:
 1. As afoot wear factory, In order to calculate and know the area discrepancy (It is the difference in area received and area marked on leather) after buying the leather and to have tangible reason for complain.
 2. As afoot wear factory, instead of categorizing the leather by SC or TR, leather grading helps to know the actual cuttable area of the leather (i.e.: A,B,C,D,E).
 3. While conducting grading of leather, defected areas will be identified and this helps the cutters to increase the productivity.
 4. As afoot wear factory, purchase variance account be kept to monitor the gains and losses resulting from regarding of leather. These records may help to obtain refunds from tanneries or may influence decision to change tanneries or accept a price increase.
 5. As afoot wear factory, results from grading of leather helps the management to make decision at which grade of leather the shoes or the product would be suitable to produce with respect to the product quality.

DETERMINE THE DEFECTS OF LEATHER

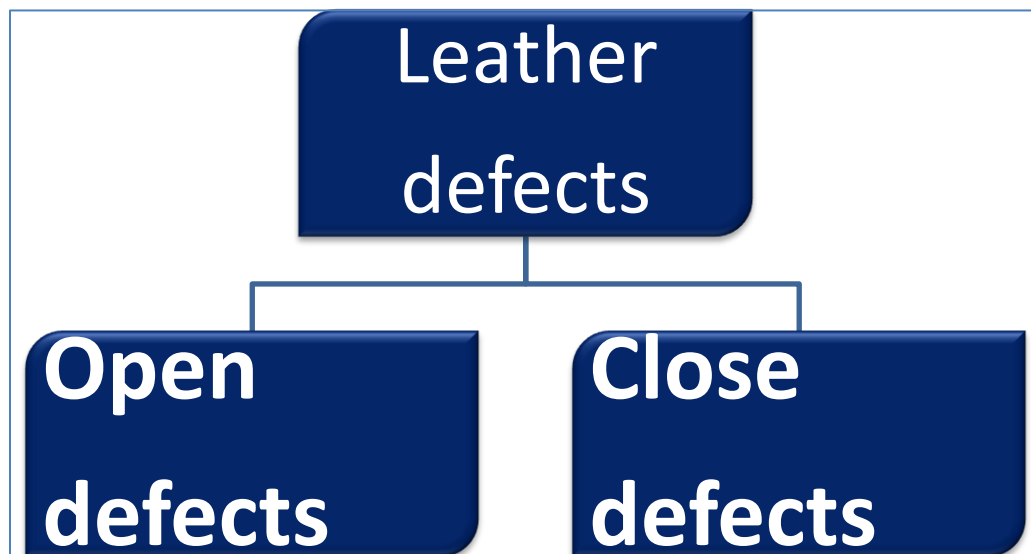
TYPES OF DEFECTS ON LEATHER

Introduction

Leather is a natural animal. There are various defects, which may finally appear on finished leather. These defects on the leather imposes different problem on footwear production. So that in order to reduce the cost and to be effective and efficient in utilizing the leather, every skin/hide for upper leather shall be examined. On this module some of the common type of leather defect, major cause and identifications and impact of defect on the footwear production are tried to explain below.

❖ Types of defects on leather

The common types of defects on leather can be classified in to closed and open defects.



- ❖ Closed defect: usually small and does not show clearly or boldly. Can be easily cover by using different finishing mechanism and it is possible to reduce and eradicate the effect. So that this kind of defect does not able to affect the production of shoes highly.
- ❖ Open defect: relatively this may affect the utility of the leather. It is clearly and boldly seen.

1. Scratches or Blemishes:

One of the most common damages of hide and skins is the grain scratches and tears. The main causes are barbed wire, nails, thorns, horns, etc. which encounter the animals during their grazing time, fighting each other or rubbing of the animal to get relief from insect bites, sores, etc.

2. Brand Marks:

It is burning of the hide/skin protein with a red hot iron. The animals are normally burned so deep that the scar tissue forms through the skin and the brands are visible on the flesh side. Brands are made:

- As a sign of ownership.
- As a cure from disease.

3. Growth Marks:

It is a wrinkle on the neck and shoulder area of the leather which is naturally occurs when the cattle get older (aged).

4. Warble hole, pock mark and Tick Marks

These are small pricing or holes, ugly white spot and dots and bad stain marks on leather. These are due to the blood sucking bird/insect and fungus/bacterial infections.

5. Vein Marks

Usually results from the use of skins of animals found dead of natural causes, from improper or delayed curing after flaying, or for some reason wherein the blood is not drained from the animal immediately after slaughter. Here the branching lines of the blood can be seen on the flesh side.

6. Flay Cuts

These flaying defects reduce considerably the value of a hide (skin). The damages can all be avoided since they are caused by carelessness or flaying by inexperienced person or by using improper tool.

7. Coarse finish

This is poor/ uneven leather finishing while in manufacturing process. Leather has not uniform finish.

8. Tick Marks

Leave scars or pits on the hide (skin) or on the finished or semi-finished leather. While rubbed to get relief from the itching leads to grain scratching or tearing and secondary infection. Ticks usually attack the tender part of the skin/hide (bellies). Grain correction cannot remove all damages.

9. Warble Holes

The larvae of the warble fly known as grub live in the flesh and lower depths of the corium makes holes through the hide for breathing and later on for escaping from the animal. Warble flies are found in hot countries.

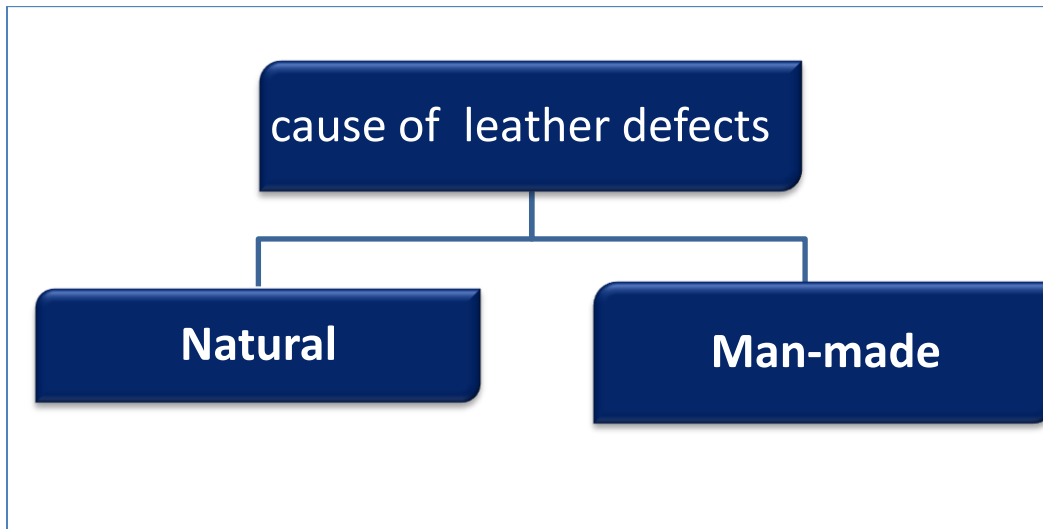
10. Loose Fibers:

This looseness on leather is due to less compacted fiber structure on the flesh side.

IDENTIFICATIONS OF THE DEFECTS ON THE LEATHER

- Cause of defects

Defects that can be found in the finished leather can be classified into two basic groups. These are natural and man-made defects.



- a) Natural defects: Some of the natural defects are vein marks, growth marks, tick marks, warble-fly marks and etc.
- b) Man-made defects: are brand marks, barbed wire marks, flay cuts, flesh cuts and etc. mostly the man-made defects affects the quality and cutting value of the leathers.

- Looseness and Pipeness:

The leather becomes abnormally soft, weak and fragile. Commonly looseness happened on belly and flank region. We can say that pipeness is the looseness on the grain surface. These might be due to nature, looseness seen on the butt and shoulder where the concentrations of fat are more in flesh side. Other the side tanning process can be the cause for looseness due to the concentration of different chemical and finishing problem.



In order to check whether the leather is loose and pipeness or not, by putting the palm of on the flash of the leather and by pressing the palm area down from the grain side using the other hand. While pressing down, if the looseness or pipeness comes that area of leather is defected.

- Thickness:

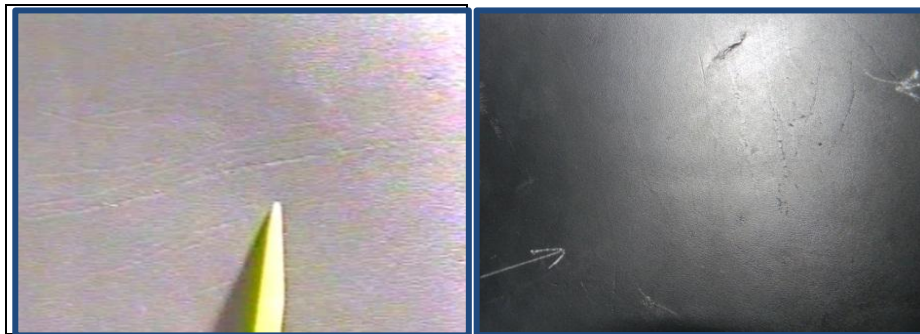
Since the leather is a natural substance it is difficult to expect uniform /the same/thickness without some variation. But in pre-tanning operation while removing flash by the blade, thickness might vary. On certain level, the evenness problem can be improved by using shaving machine. So this is happen when the skin is below the expected thickness.



So for the thickness of the leather it is good to use on the range (like: 1.2 – 1.4 mm) by taking 0.2 mm tolerance. Check the thickness of the leather using the thickness gauge at different point of the leather.

- Scratch and Scar marks :

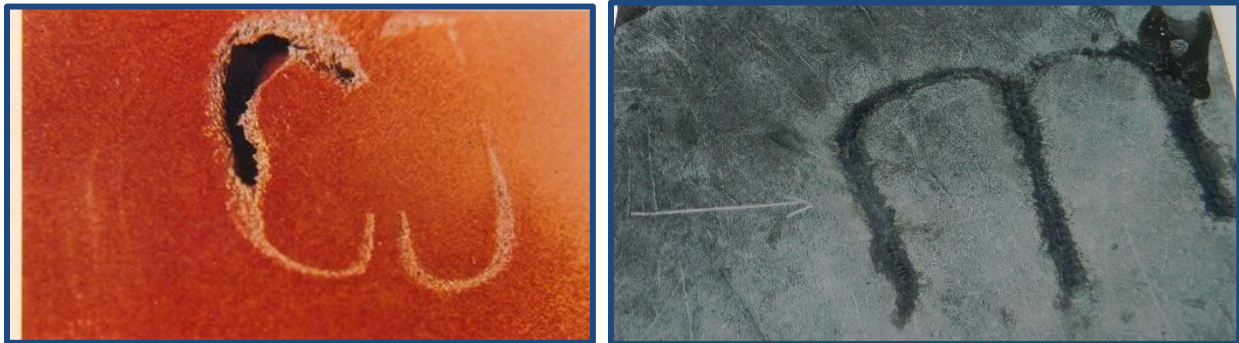
It happens when the cow grassing though bush different tree branch and other sharp materials grazes the animal. This kind of defect is open and it became more visible while the leather stretched during lasting. Also Scratch defect may be happened when the animals fight by horn and scratch by horns commonly closed, it is not seen clearly.



Usually this defect seen on the gain side of the leather lined as long or short scratch. And by pulling the leather it become more visible.

- Brand marks

Commonly rural farmers/ pastoral/ have and rare a lot of cattle, goat and sheep. In order to manage and differentiate one's from another's, they used different identification mechanism/ brand marks/. The brand marks might be numbers, name or different symbols/stamp/ using paints and hot materials. Even though the pastorals use it as an identification ID, the leather has been damaged.

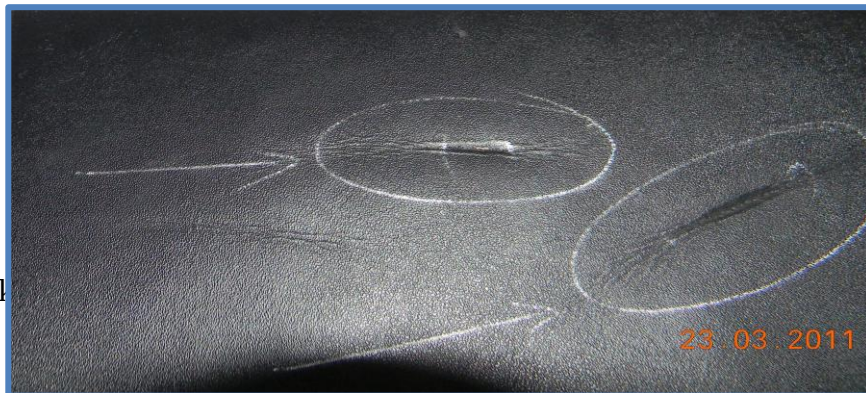


As shown in the figure, the brand mark defects are easily identified.

- Flay cuts

The damages are caused by carelessness of flayer person or when flaying is cried out by inexperienced person or by using improper tool. Prominent Flay cut highly affect and damage the quality of leather.

- Crack



leather manufacturing process. On other hand, keeping/storing/ the leather in



Four fold and key test are used to check leather crackness.

- Bleeding

It is the diffusion of uncombined materials from the interior of leather to the grain surface where they may contaminate other materials or mar the appearance of the leather. This usually occurs at elevated temperatures and is commonly designated as staining.

- Tearing:

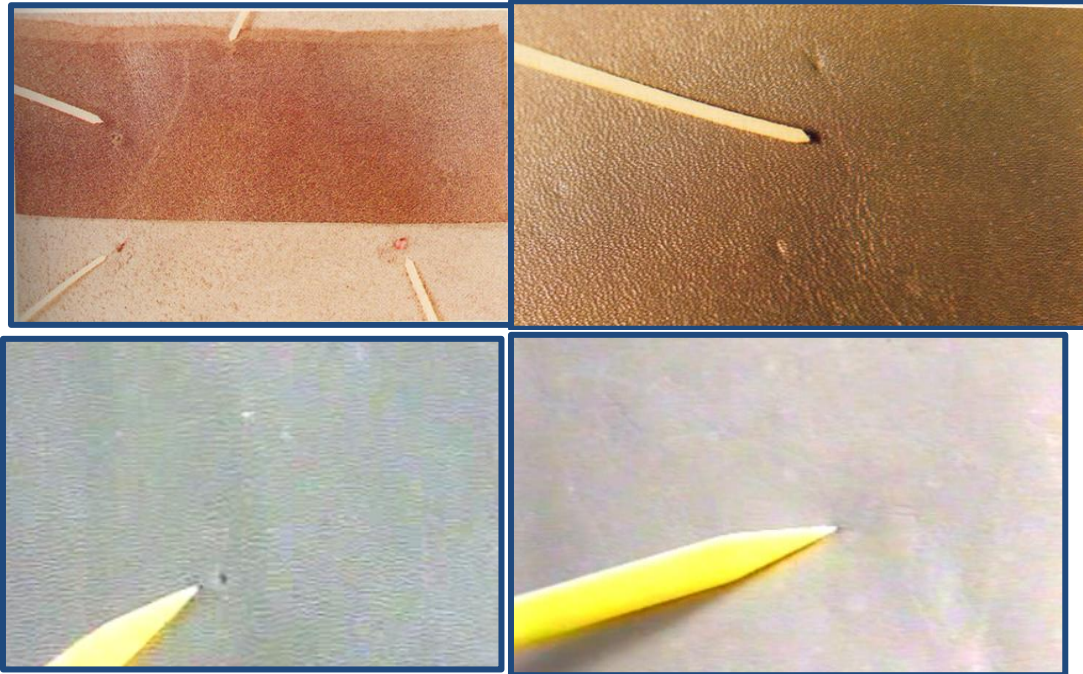
The common causes for leather tearing problem are when the thickness of the leather and fiber strength is below the normal and if the tanning process have a problem tearing might be happened. Normally suede and split leather have weak grain fiber strength so that the tendency to be tearing is more.



To check the whether the leather is weak and easily tear able or not, first select one or two points at any region of the leather and cut the leather at 90° as show in the figure. Then gently try to tear the leather, if the leather starts to tear easily, then it is possible to decide the quality of leather is poor.

a) Warble hole, pock mark and Tick mark

–these defect leave scars or pits on the hide (skin), grain scratching, holes and secondary infection and bad white spot due to fungus/bacteria. These are due to when the cattle rubbing to get relief from the itching, blood sucking birds or insects and due to sanitary problem. Ticks usually attack the tender part of the skin/hide (bellies).



Tick mark, warble hole by birds and insects and white spot due to infection on the leather are visible by neck eyes while we stretched it.

b) Growth marks:

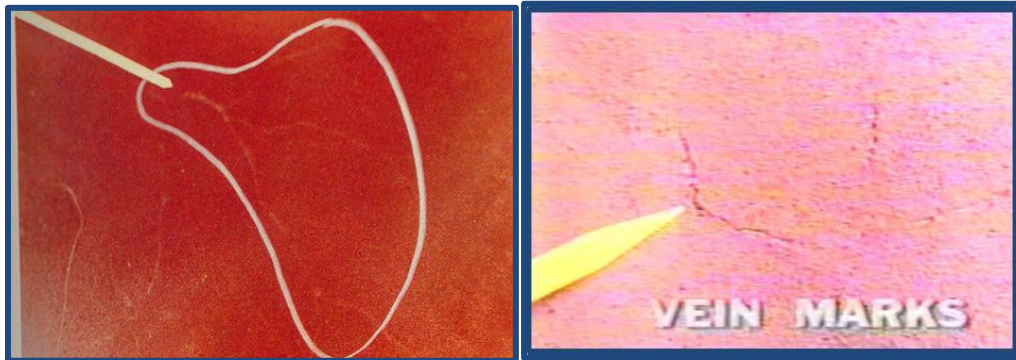
This defect where naturally happened on the neck and shoulder region of the leather when the cattle get older. These defects seem as a wrinkle which lined parallel around neck and shoulder.





c) Vein marks – blood vessel on both side of the leather

This is when the cattle had been stressed and frazzled for a long period of time or affected by the disease. By this, the steam mark of blood vessel and veins are observed on flesh and grain side of the leather.



EFFECTS OF DEFECTS ON FOOTWEAR

Products that are manufactured from leather are directly and indirectly influenced by the quality of leather. Generally, defect on leather prominently affects the quality of products, production quantity and productivity of the workers.

- Affect Quality of product /shoes/
 - ✓ Even though defect of leather are group in to closed and open and from this some of the defects are less visible and have less effect on production, commonly defected leather affect the quality of products. If we use those defected leather for footwear purpose, it affects the quality of the shoe (products) and reduced the appearance. Generally products that are manufactured from defected leathers have degraded value in front of the customer.
 - ✓ Still availability of different types of defects on the leather are one of the reason that enforced the major footwear producers to use materials other than leather(synthetic, textile, canvas etc...)even though those substitute material does not have natural breathing characteristic as leather ,because they are fully defect free materials producers forcefully chooses it. In addition to this, it incurs additional costs for leather manufacturing tanneries to avoid or hid those defects. So that using these synthetic or corrected leather materials in footwear production directly reduce the quality of products.
- Reduce Price of leather and leather products/shoe:

When the percentage area of defect is being going more as compare to the percentage cuttable area of leather, thus directly affect and reduced the grade of leather which in turn reduce the value /price of the leather. And those products/shoes that are manufactured from defect leathers, the price will be lower as compare to product from high quality genuine leather.
- Affect production and productivity:

If cutter uses and tries to cut defected leather, they will take more time. The more the defected the leather the efficiency of cutter's reduced. This affects the productivity of the cutter and the cutting section/department. On other hands, while using loose leather and leather that easily tear in stitching and lasting section also affect the production and productivity of the section and workers. On this, leather defect indirectly affects the manufacturing cost of a product and leads to rise/ increase it.

METHOD OF DETERMINATION OF THE DEFECTED AREA BY GRID METHOD

INTRODUCTION

The visual inspection systems for textured surfaces have application in different areas for analysis of defects in textile, lumber, automobile paints, etc. Leather as a natural material with its variety of visual appearances – non homogeneous in color, thickness, brightness, wrinkleless, etc. is a complex object for control and analysis. The surface defects on leather affect the aesthetic appearance of leather goods and the amount of usable area. The presence of defects is critical factor for adjustment of the leather for manufacturing of particular good, because the existence of areas with leather defects may be considered as unusable or useful only for particular purposes. There are well known different methods for analysis of leathers surface defects and classifications. Classification basic indexes of surface defects on leathers are the shape, size, area, depth, color, origin of the defect, etc. The proposed classifications are based only on part of these indexes because of which is obtained non-complete description of the defects.

Objectives of leather assessment:

- To check the supplier's quoted area measurements and to attribute to the material an area discrepancy coefficient. This is done by using a leather measuring machine to accurately determine the area of each skin as received from the tannery. This result is subtracted from the supplier's quoted area to show the discrepancy coefficient as a percentage figure.
- To determine the average skin size of received material. If large, complicated components need to be cut from a smaller skin, this may increase the leather needed, as there will be more unavoidable waste on a smaller skin than when cutting the same components from a larger one. This has implications on costing and in the quantity of skins the cutter will need.
- To define the method of cutting. These methods are: I. Selective: when there is little or no visible difference between leathers in the same delivery. This makes it simpler to cut in production. II. Match marked: when there are significant differences in color or grain patterns on skins in a batch, then the cutter needs more time to cut and match the components. Examples of such leathers are nubuck, suede and aniline leathers.

Generally, Leather is a natural animal. There are various defects, which may finally appear on finished leather. These defects on the leather imposes different problem on footwear production. So that in order to reduce the cost and to be effective and efficient in utilizing the leather, every skin/hide for upper leather shall be examined. On this module some of the common Method of determination of the defected area, Method of measuring defected area by fist method and Measurement of leather area and defected area using grid method are explain below.

❖ The major leather area measurement methods are:

- ✓ Using area measuring machine(the most accurate method and widely used in tannery)



- ✓ Using area measuring grid tool (commonly used in footwear factory for the purpose of regarding and very close to the actual and accurate size.)



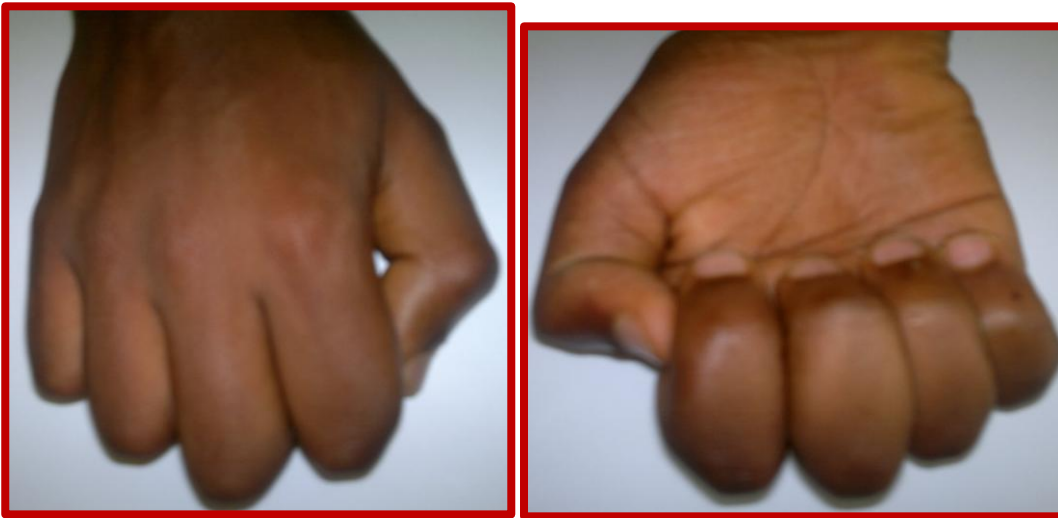
❖ The Common leather defect measuring methods are:

- ✓ By necked eyes (observation and judgment) –it required experience but not an accurate method.
- ✓ By using hand-fist (resemble/close to accuracy.)
- ✓ By using measuring grid tool (widely used and the most accepted one. Still it is not 100% accurate)
- ✓ In addition to the above method, there are other method used in different countries and institutes. Now a day, digital computerized leather defect sensor instrument also innovated. Who knows in the near future this instrument might be one of the commonly used leather defect measurement method.

Method of measuring defected area by fist method

This method of measuring defected area of leather is better than measuring/guessing by eye but it is not more accurate as grid method very small deviation may be there. But if we used the one that have almost the same as one sq.dm hand fist, the result become almost accurate and it also save measuring time.

$$\text{Percentage of wastage} = \frac{\text{Total defect area of leather}}{\text{Total area of leather}} * 100$$



- ✓ **For a big Hand-clenched fist – it is comparatively equal to one decimeter square. (9 -10 fists equal to 1 sq.ft)**
- ✓ **While in using clenched fist – commonly certain groups takes 13 average clenched fists as approximately equal to one sq.ft.(13 fists equal to 1sq.ft)**

- ❖ The entire steps used to measure the defect area of leather by fist method are almost the same as grid method. The only different is in fist method instead of using grid tool hand fist is substitutable used.
 1. Select the leather from the sample
 2. Prepare the leather on the flat surface to measure the total area
 3. Use grading tool (grid plate which is commonly 10 sq. dm size)
 4. white pencil to sketch/mark the plate
 5. Then drawing the grading plate on the leather using the white pencil.
 6. Then measure the leather size by counting the sketched grading plate on the leather.
 7. After sum up all the measurement, convert the decimeter square into feet square by dividing the result by 9.29. At this point the exact value/size of the leather in sq.ft is known which might be the same as or different from the written size on leather by the tannery.
 8. Then compare the final result with the written size on leather by this it is possible to check the area discrepancies or whether the written size on the leather is correct or not.
 9. After this it is possible to move to check the defect area of leather by assessing the major and minor defect on the leather. *All defects on the leather which aren't used for footwear production should be identified. (The possible types of defect on the leather are Looseness and Pipeness, Thickness, Scratch and Scar marks, Brand marks, Flay cuts,*

Cracking, Bleeding, Tearing, Warble hole, pock mark and Tick mark, Growth marks, Vein marks, etc.)

10. If any types of defect are detected while in assessing on the leather, mark/circle the defected region using white pencil. If the space between two marked/circled defected region cannot allow to insert in between *one derby quarter (number 8 size by English sizing system or 42 size by French sizing system)*, then should consider those two defected region as one and marked/circled as one defect region.



11. After complete marking all the defected area, measure each of the identified defected regions using *hand-fist* and put the exact size in dm.sq.



THE METHOD OF MEASURING LEATHER

A shoe factory must measure and check all the incoming material immediately upon arrival against supplier's delivery notes. So far leather area is concerned; there should not be more than 5% discrepancy from the supplier and the factory. Large discrepancy must be notified to the supplier as the material should not be used before the difference are not agreed because leather cost constitute about 60 to 70% cost of the shoe and even a slight variation can cause to suffer a heavy loss by the shoe factory.

Uppers material especially "Leather" are purchased/sold by area (in sq.ft. sq. dm.) is the smallest unit while sq.ft. is the largest area.

$$9.29 \text{ sq.dm.} = 1 \text{ sq.ft.}$$

❖ Leather measuring machine

Area of leather is measured generally by the tannery using electronic area measuring machine which gives rapid and accurate result. The accuracy can be checked time to time with the measuring device supplied by the manufacturer. Generally, the accuracy is checked using a piece of material of known area but even plastic grids can be used for this purpose. Unfortunately, this machine is too expensive to be installed in small scale footwear units.

Some of the other methods for measuring area are mentioned below:

- (i) Using a plan meter
- (ii) Square perspire
- (iii) Measurement by large plastic grid (the most effective area)

These all are time consuming and cannot be used for bulk checking.

Here the only practical method of bulk checking is by machine. The area is stamped on the flesh side of each skin mainly in the butt area by the backbone.

❖ Grid method

To measure the area on random basis we may use a plastic grid called area measuring grid manufactured from a transparent plastic material. A gauge of *10 sq.dm.* Graduated in square decimeters *either of two shapes* will prove suitable.

❖ Main steps for leather area measuring by grid method:

1. Collect the leather from the bundle.



2. Keep and prepare the leather on the flat table and it should be suitable to measure the total area of the leather.



3. Use grading tool (grid plate which is commonly 10 sq. dm size)

1	2	5	7	9
2	4	6	8	10

= 10 sq.dm

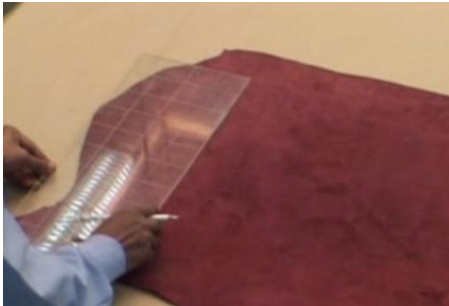
1	2	3	4
5	6	7	
8	9		
10			

= 10 sq.dm

1 Block = 1 sq.dm.

4. Then drawing the grading plate sequentially step by steps on the full size of leather using the white pencil. If the space is enough to draw the full size of grid plate it is good. Unfortunately, due to the irregular shape of leather it can be difficult to get the space for the whole plate to draw, so it is possible to draw/mark even the spare/fraction of leather part using the grid and measure in decimeter.

Step 1



Step 2



Step 3



5. Then measure the leather size by counting the sketched grading plate on the leather. Measure each space/block that drawn on the leather in decimeter.



6. Sum up each blocks and calculate the total area of leather in decimeter and convert in to square feet (1sq.ft = 9.29 sq.dm).
7. Then compare the actual measured value of leather with the area that is written on the back of the leather by the tannery.

Area Discrepancy

A shoe factory must measure and check all the incoming leather as well as other materials immediately upon arrival against suppliers' delivery notes. so far leather area is concerned; the area discrepancy should not be more than 4 to 5% Area discrepancy from the supplier and factory. Large discrepancy must be notified to the supplier as the material/leathers should not be used before the difference are not agreed because leather cost constitute about 60 to 70 cost of the shoe and even a slight variation can cause to suffer a heavy loss by the shoe factory. is the area shortage.

$$\text{Formula for area discrepancy} = \frac{\text{Quoted area} - \text{Actual area}}{\text{Quoted area}} \times 100$$

Example 4.1

Let area quarter to be 120 SDM:

Actual area = 100 SDM

$$\begin{aligned}\% \text{ area discrepancy} &= \frac{\text{Quoted area} - \text{Actual area}}{\text{Quoted area}} \times 100 \\ &= \frac{(120 - 100)}{120} \times 100 \\ &= \frac{20}{120} \times 100 \\ &= \frac{100}{6} = 16.66\%\end{aligned}$$

An explained group will be able to assess defects and large grade leather visually without mechanical. However, it is essential that one has an accurate rapid method of the measurement.

Random Check of Area

Since, it is very difficult for a shoe factory to check each and every skin area, it is recommended to take several bundles of skin from a newly arrived shipment and to select 5-15 skins of each bundle for area check.

The area measurement results can be recorded as follows:

Area Measurement of Samples

S.N.	Consign.	Date of receipt	Name of supplier	Total area by Supp.	Total area by vendor	Discrepancy %

MEASUREMENT OF DEFECTED AREA OF LEATHER BY GRID

A defective area: is an area containing defects which cannot appear on cut components, thus, causing the cutting position to be changed. it affects the value of the leather by reducing the cuttable area of it.

It is not only actual area of the defects but those peripheral parts round the defects which, because of location in the skin, cannot be used.

As experienced man will be able to assess defects and hence grade leather visually without mechanical aids. However, it is essential that one has an accurate & rapid method of calculating the defective and to verify. For this, we have plastic grid as mentioned above.

USE OF GRADING TOOL

A simple way of using the grading tool and hence achieving the skill of visual grading is defined here.

MEASUREMENT OF DEFECTED AREA BY GRID METHOD

As a foot wear manufacturer: the following steps are the major sequences used to calculate and identify the actual size of leather and defected area of leather by using grid method.

1. Select the leather from the sample



2. Prepare the leather on the flat surface to measure the total area



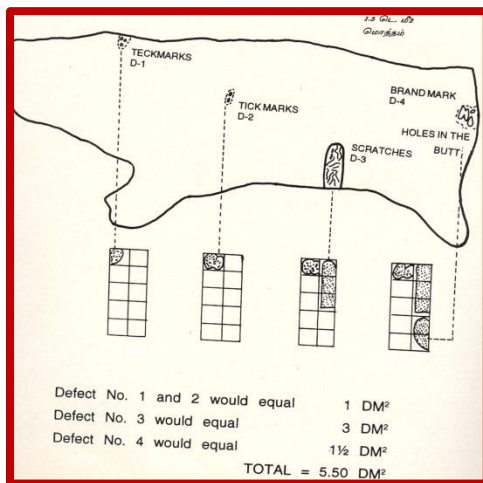
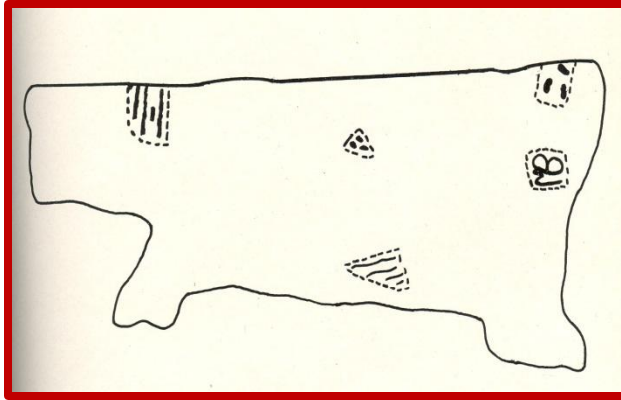
3. Use grading tool (grid plate which is commonly 10 sq. dm size)



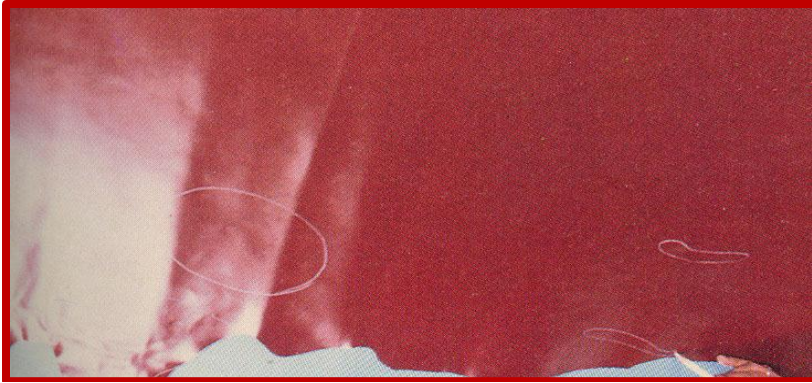
4. white pencil to sketch/mark the plate



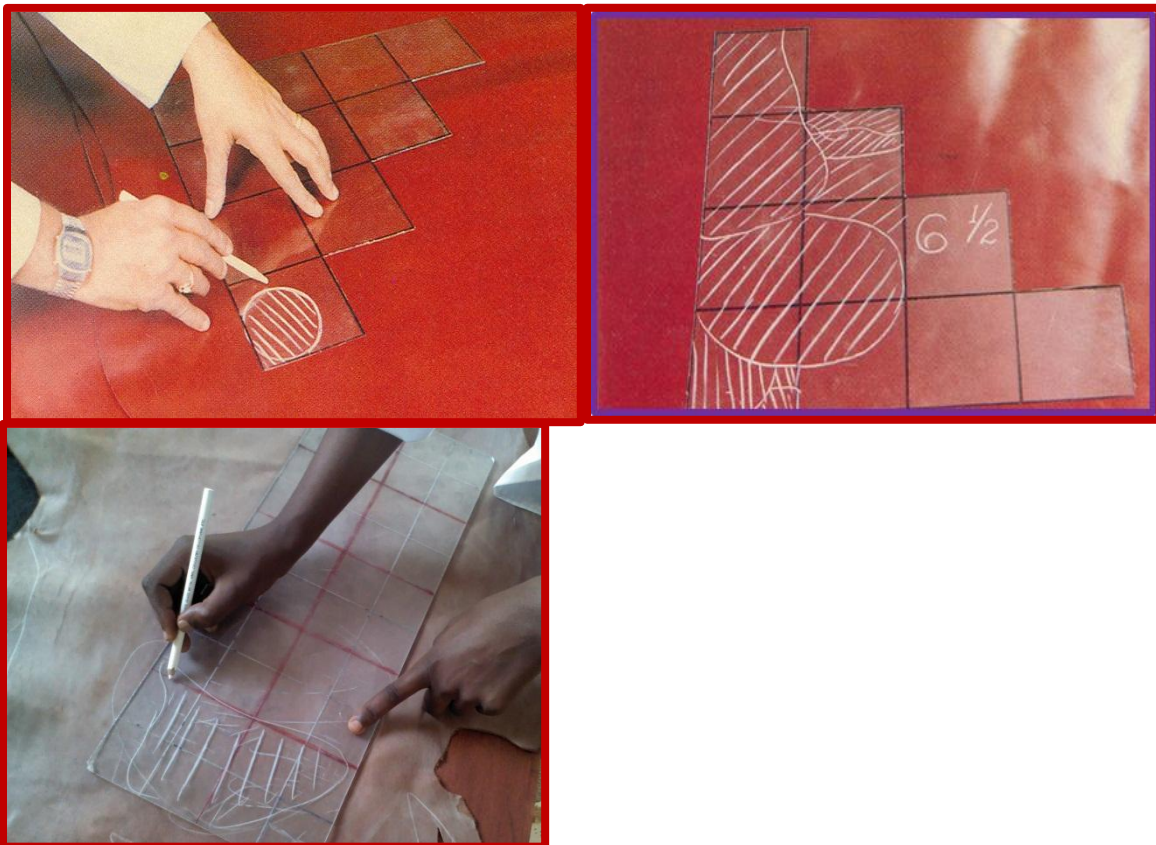
5. Then drawing the grading plate on the leather using the white pencil.
6. Then measure the leather size by counting the sketched grading plate on the leather.
7. After sum up all the measurement, convert the decimeter square into feet square by dividing the result by 9.29. At this point the exact value/size of the leather in sq.ft is known which might be the same as or different from the written size on leather by the tannery.
8. Then compare the final result with the written size on leather by this it is possible to check the area discrepancies or whether the written size on the leather is correct or not.
9. After this it is possible to move to check the defect area of leather by assessing the major and minor defect on the leather. *All defects on the leather which aren't used for footwear production should be identified. (The possible types of defect on the leather are Looseness and Pipeness, Thickness, Scratch and Scar marks, Brand marks, Flay cuts, Cracking, Bleeding, Tearing, Warble hole, pock mark and Tick mark, Growth marks, Vein marks, etc.)*



10. If any types of defect are detected while in assessing on the leather, mark/circle the defected region using white pencil. If the space between two marked/circled defected region cannot allow to insert in between *one derby quarter (number 8 size by English sizing system or 42 size by French sizing system)*, then should consider those two defected region as one and marked/circled as one defect region.



11. After complete marking all the defected area, measure each of the identified defected regions using *grading tool (grid plate)* and put the exact size in dm.sq.



12. Then sum up the exact size of defected region in dm.sq on the leather, and convert the decimeter square into feet square by dividing the result by 9.29. At this point the exact value/size of defects on the leather is known by sq.ft. From this it is possible to calculate the percentage of wastage

$$\text{Percentage of wastage} = \frac{\text{Total defect area of leather}}{\text{Total area of leather}} \times 100$$

- ❖ After we calculate the percentage of wastage the grade of leather.
- ❖ While categorizing leather according to the calculated value it may come new grade that is different from formally described by the tannery. Or the new calculated grade is the same as that of the previous one.
- ❖ If the regarded value is different, Purchase cost variance calculation will come after. This is used to show the loss of cuttable leather value and how much money we lost by paying for the wrong grade. Based on the result of regarding and purchase cost variance calculation the footwear factories can appeal to the tannery on the losses.

CALCULATION OF CUTTING VALUE

The total defective area is then calculated as a % against total skin area and classified according to the cutting value table mentioned below:

Grade	Cutting Value	Wastage
A or 1	100% to 97%	Upto 3%
B or 2	96% to 92%	8%
C or 3	91% to 87%	13%
D or 4	86% to 82%	18%
E or 5	81% to 77%	23% etc.

The second record to be kept is the profit and loss sheet, which is a continuous record of all shipment

PERFORM QUALITY CHECK ON LEATHER

PHYSICAL TESTS (NON LABORATORY TESTS) ON LEATHER

Introduction

Leather is a very complex material, which must be subjected to laboratory tests for accurate assessment. This may not always be possible as most tanneries do not have adequate testing facilities and some of the tests are very lengthy for any buyer to wait.

There are, however, a few crude and quick tests, which can help the buyer in taking correct decision. These tests will give a danger signal, regarding the whole consignment. Selection of leather in tannery consists of two stages i.e., random tests and selection of whole consignment. Samples are selected on random basis. It is difficult to assess for quality.

1. Random test

In random test the following activities are carried out.

a) Selection of samples

At least one sample leather is picked up from each bundle or from each sub-variety of batch. This sample leather is used as a reference for comparing the hides to be tested with it.

b) Substance/thickness

The thickness of the leather is measured comparing with the reference sample leather and with the help of thickness gauge.

c) Finish appearance

The finish appearance of the leather is checked by comparing with the reference sample leather.

d) Feel/softness and stretch

Feel/softness of the leather is checked by filling up with palm with it at different places and comparing with the reference sample leather.

e) Adhesion of finish

The leather surface is checked for its good finishing by using scotch tape and stick four inches on leather grain comparing with the reference sample leather. .

f) Cracking

Any tendency of pigment or grain cracking of the leather is checked comparing with the reference sample leather. .

g) Wet and dry rub

Any transfer of finish or any removal of finish of is checked by using dry and wet white fabric around your finger comparing with the reference sample leather.

h) Strength

Strength of the leather is checked by tearing it and comparing with the reference sample leather.

i) Fading

Any fading or change in color of the leather is checked by keeping a cut piece in the sun and comparing with the reference sample leather.

j) Water repellency

Physical deterioration of leather is checked by dipping a small piece in water and rubbing the grain with fabrics.

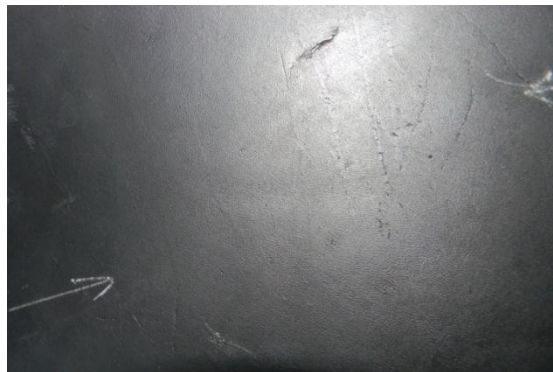
k) Chemical resistance

Damage of the finish is checked by applying chemicals to the grain side of the leather.

2. Leather defects

Leather is a natural animal. There are various defects, which may finally appear on finished leather. Every skin of an incoming shipment of upper leather is examined for possible defects. Some of the common leather defects are listed below:

a) Scratches



b) Brand marks



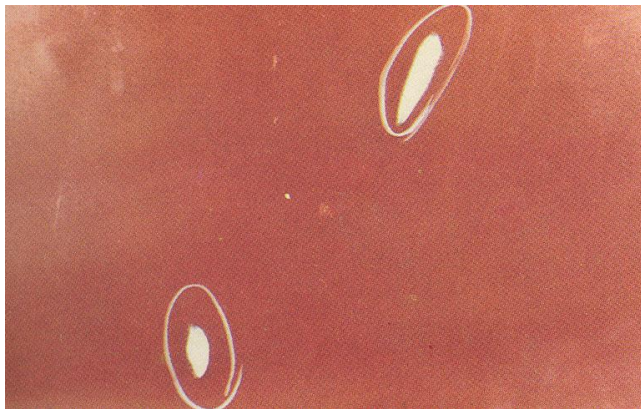
Fig: brand marks in butt area

c) Growth marks



Fig: Growth Marks in the Neck

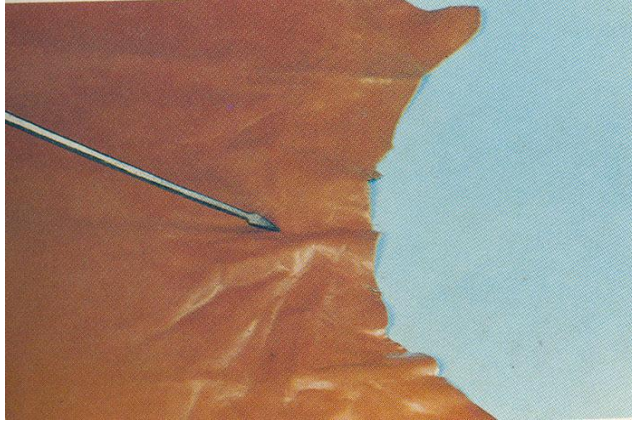
d) Warble and tick marks



e) Grain cracking



f) Loose leather



g) Stain marks on flesh for un lined shoes



and the quality area of the shoes (vamps, aprons, quarters, toecaps and other visible part of the

LABORATORY LEATHER TESTS

Leather can be tested (non-laboratory) within the factory .in addition to this; leather can be tested with in the laboratory. Laboratory test include both physical and chemical tests.

Some of the major laboratory leather tests are:

- Tear strength
- Tensile Strength
- Flexing
- Grain Crack
- Color Fastness
- Abrasion Resistance for quarter &heel grip
- Water Vapor Permeability
- Water absorption
- Fungus Test
- PH Value (chemical test)
- Chromium VI (chemical test) etc.

Conducting products tests in Laboratory is very important and it increases the products value and that able to standardized the products. Especially conducting the test in the certified lab ensures the products acceptance and helps the manufacturer to produce their products as per the standard using quality and adequate materials. Standardizing the products enable the manufacturers, traders, customers and even the countries - to speak common language. So that the market acceptance and sell volume will be increased.

METHOD OF SAMPLE SELECTION:

The way the sample reference leather taken is very important since the other leather quality is measured relative to this sample. Therefore, at least one hide is picked up from each bundle of 50 or from each sub-variety of batch and used as a reference. This is to ensure that the selected hides consist of full spectrum and are true representative of the consignment. If these are good, then the consignment should also be good. The assessment of these hides should indicate troubled areas for thorough screening.

Why sampling?

- ✓ Get information about large populations.
- ✓ When it's impossible to study the whole population
- ✓ To be cost effective, to be accurate and time saving.

Sample is selected according to established principles. These are:

- The sample must be representative of the entire population/batch.
- One must be able to extrapolate inferences, within known and acceptable margins of error, from the sample to the wider population.

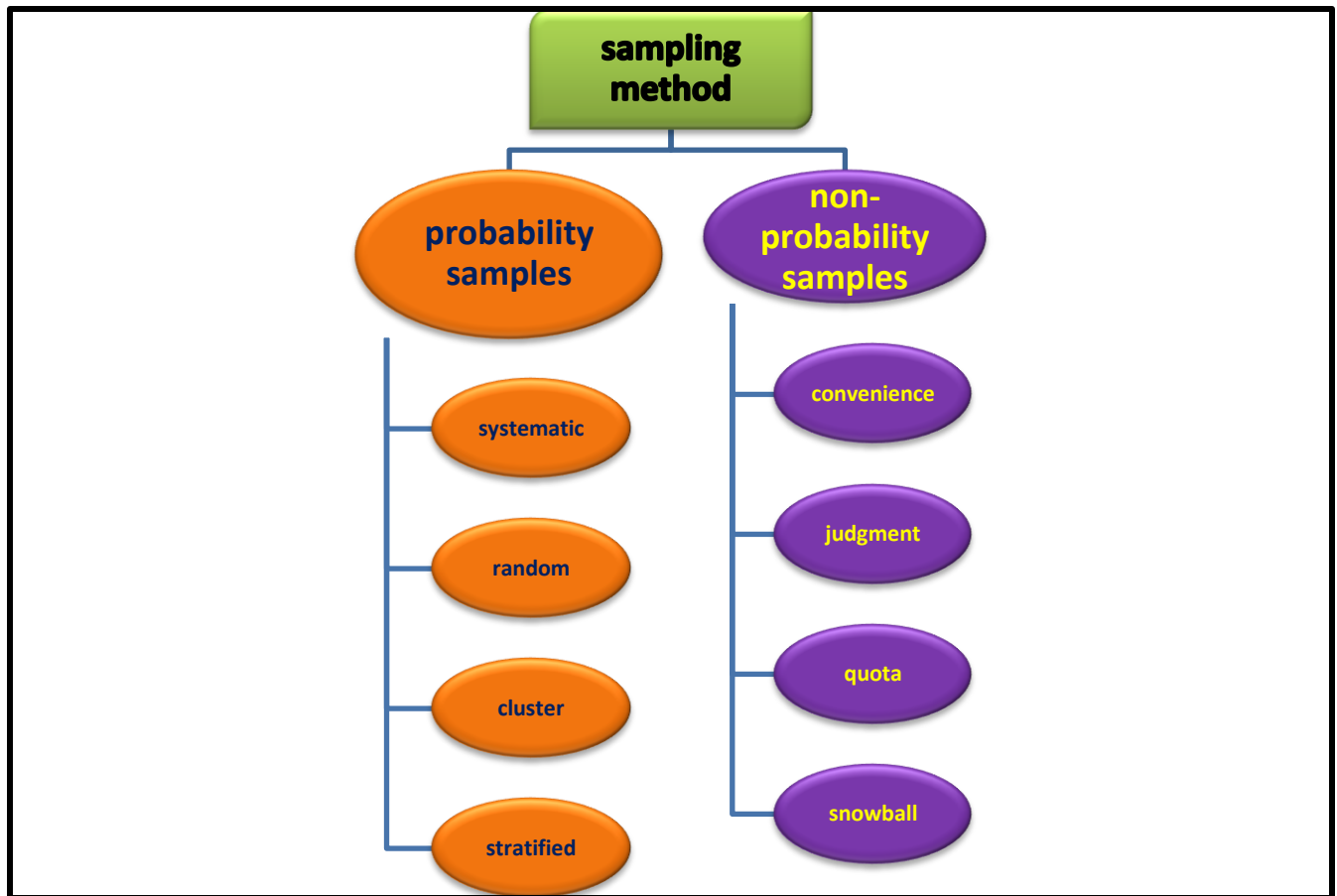
Common steps and words in sampling:

1. Define Target Population: Target Population: is the population to be studied/ to which the investigator wants to generalize his results
2. Selection of a sampling frame: Sampling frame is the list of all the sampling units from which sample is drawn.
3. Sampling scheme/method for sampling/: Method of selecting sampling units from sampling frame. (Probability or Non-probability sampling)
4. Sampling Unit: smallest unit from which sample can be selected.
5. Calculate error/chance of fluctuation/:

Method of sampling:

1. Probability samples are sometimes known as random samples. They are the most accurate of the sample selection methods. When using a probability sample, each element in the population has a known and non-zero chance of being selected into the sample. Usually, each member of the population has the same chance of being included in the probability sample. With a probability sample, the first step is usually to try to find a sampling frame. Using this frame, individuals or households are numbered, and some numbers are chosen at random to determine who is surveyed. If no frame is available, other methods are used to ensure that every population member has an equal, or known, chance of inclusion in the survey.
2. Random Sampling: the purest form of probability sampling. Assures each element in the population has an equal chance of being included in the sample.
3. Stratified Sampling: Sub-samples are randomly drawn from samples within different strata that are more or less equal on some characteristic
4. Cluster Sampling: The primary sampling unit is not the individual element, but a large cluster of elements. Either the cluster is randomly selected or the elements within are randomly selected
5. Systematic sampling: relies on arranging the target population according to some ordering scheme and then selecting elements at regular intervals through that ordered list.
6. Non probability sampling: Any sampling method where some elements of population have no chance of selection (these are sometimes referred to as 'out of coverage'/'under covered'), or where the probability of selection can't be accurately determined. It involves the selection of elements based on assumptions regarding the population of interest, which forms the criteria for selection. Hence, because the selection of elements is nonrandom, nonprobability sampling not allows the estimation of sampling errors.

7. Quota sampling: The population is first segmented into mutually exclusive sub-groups, just as in stratified sampling. Then judgment used to select subjects or units from each segment based on a specified proportion. For example, an interviewer may be told to sample 200 females and 300 males between the age of 45 and 60. It is this second step which makes the technique one of non-probability sampling.
8. Convenience sampling: Sometimes known as grab or opportunity sampling or accidental or haphazard sampling. A type of nonprobability sampling which involves the sample being drawn from that part of the population which is close to hand. That is, readily available and convenient. The researcher using such a sample cannot scientifically make generalizations about the total population from this sample because it would not be representative enough. For example, if the interviewer was to conduct a survey at a shopping center early in the morning on a given day, the people that he/she could interview would be limited to those given there at that given time, which would not represent the views of other members of society in such an area, if the survey was to be conducted at different times of day and several times per week. This type of sampling is most useful for pilot testing.
9. Judgmental sampling: - The researcher chooses the sample based on who they think would be appropriate for the study. This is used primarily when there is a limited number of people that have expertise in the area being researched.
10. Snowball samples: In some communities (especially those in developing countries), the only feasible way to find its members is by asking other members. The first step in this procedure is to find a few members of the population using any method. This step is denoted as the first round. Then you ask each of these first-round members if they know of any others. The names given will form the second round. Then you go to each of those second-round people, and ask them for more names. This process is repeated for several more rounds. The process is stopped when you start hearing about the same people over and over again. The methodology used to stop the procedure can be described as follow. For each round, count the number of names you get and the number of new names obtained in this round. Then calculate the percentage of new names to the total number of names. For example, if the second round gives you 100 names, but 30 of them are for people who were mentioned in the first round, then the percentage of new names for that round is 70 per cent. This percentage of new names is high at first, but then drops sharply. When the percentage of new names drops to around 10 per cent, then stop. This often happens at the fourth or fifth round. After performing this, something close to a list of the whole population is available, and many of the population members will know that you are planning some research. Using that list, you can draw a random sample. Snowball sampling works well when members of a population know each other. The problem with snowball sampling is that isolated people will not be included in the study.



Since probability samplings are the most accurate and commonly used sample selection methods as compare to the non - probability samplings. While using a probability sample; each element in the population has a known and non-zero chance of being selected into the sample. Usually, each member of the population has the same chance of being included in the probability sample. so in order to conduct random leather inspection random sampling method is applicable.

1. Local tanneries, commonly in leather manufacturing process, when they categorized one batch or population means the quantity of leather in one drum.
2. Even though the capacity of the drums to collect(bring together) the leathers may varies but the average size of drums which is common used in production in most tanneries can collect up to 3000 skin and can hold up to 300 full hide or up to 600 half hide(calf) of leather.
3. Foot wear factories, to conduct random sampling/random leather inspection/ before shipment, to setting population/batch size, commonly the expected batch/population size can be 50-3000 skin or 50 -300 full hide or 50 - 600 half hide/calf/.
4. While fixing sample frame/size: the whole batch/population will be discarded or rejected if the sample results are not accepted as per the required parameters. The quantity of leather used for sampling/sample size/ should fixed in considering that will give accurate, precise and liable to pass or reject the whole consignment/batch/population.

5. To get the right results, for skin leather, the minimum sample sizes are 10 – 15 skin shall be randomly selected from the batch/population.
6. For hide leather, the minimum sample sizes are 5-10 hide shall be randomly selected from the batch/population. it can be applicable for full or half size hide.
7. Additional sample can be added more than the above mentioned quantity based on the result found after the inspection of the sample. Sometimes the variation may be occurred among the sample. So as much as possible fluctuation/variation shall be reduced. so that additional sample (5-10 skin/hide) can be taken from the batch based on the results in order to reduce the variation and to increase the liability of the test.

ASSESS THE GRADE OF THE LEATHER

Average grade of leather grade

Introduction

Leather is a very complex material, which there are, however, a few crude and quick tests, which can help the buyer in taking correct decision. These tests will give a danger signal, regarding the whole consignment. so before buying and simply receiving the whole ordered leather depending only on the tanneries' leather grading system, while receiving the order by using random tests method reassessing is very crucial. Then, after receiving the whole order before using it directly for production, conducting reassessment/re-grading of the whole consignment is important. This enables the footwear factories to re-appeal and give feedback regards of the quality of the leather as well they can able to complain on the price based on purchase cost variance calculation. In addition to this, assessing the leather before using it in productions enables the footwear factories to identifies whether the received leathers are suitable for production (for required design or model). This learning guide briefly tried to explain on how to assess the average grade of leather, on how to assess the cutting value of the leather(suitability of leather for footwear production) and on the method of storage and bundling of leather in the store. While dispatching the leather to cutters issuing system is shall be or preferably uses average system. If leathers are issued to the cutters based on the average grade, the optimal usage of leather will be achieved and wastage will be reduced.

Average grade of leather grade

While dispatching leather from store to the cutters, Average grade of leather shall be issued. That means it is the combination of the entire grade types, if the leather is TR leathers. (From grade A to grade E). If leathers are issued to the cutters based on the average grade, the optimal usage of leather will be achieved and wastage will be reduced. The cutters can able to cut the front part shoes) from A, B & C grade leathers. For the other parts of the shoes like counters, destinies, straps, collars, tongues, zip guards, and other small and less visible part of the shoes possibly can cut from E and F grade leathers. so that leather wastage will be minimized and maximize the optimal usage of leathers. Leather selectors in the store, unless there is a special order, they should deliver mixed leather (Grade A to grade E) to all cutters in considering the average grade to be c grade. Sometimes the leather may be SC (selected grade: a combination of F, G &H grade leather) OR SG leathers(selected grade: may be a combination of leather having the same grade i.e. all A grade only OR B only etc) so whether the leather are TR,SC OR SG, the leather selectors Should issue the leather on the average grade basis.

Example: if the daily production order for two cutters are:

Cutter A: 367.5 sq.ft. Cow full grain, TR leather to produces 150 pair of shoes per day of XXM model.

Cutter B: 374 sq.ft cows corrected SC leather to produces 170 pair of shoes per day of RRN model.

SO, the leather selector should be issued the TR leather by keeping C grade as average grade for cutter A.

And for SC leathers, (if F, G &H), issued the leather by keeping G grade as average leather for cutter B.

- There may be different types rating in issuing the 367.5 SQ.FT of leather by keeping grade c as average grade, the following can be one option for cutter A.

LEATHER GRADE	QUANTITY	REMARK
F	89.1 SQ.FT	
G	189.3	AVERAGE
H	89.1 SQ.FT	
TOTAL	367.5 SQ.FT	

- There may be different types rating in issuing the 374 SQ.FT of leather by keeping grade c as average grade, the following can be one option for cutter B.

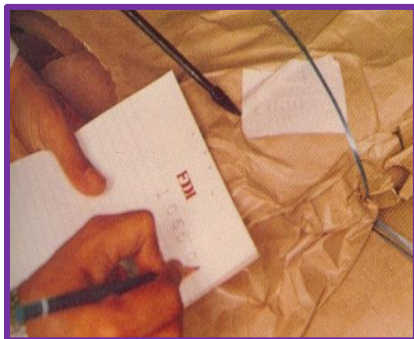
LEATHER GRADE	QUANTITY	REMARK
A	33 SQ.FT	
B	88 SQ.FT	
C	132 SQ.FT	AVERAGE
D	88 SQ.FT	
E	33 SQ.FT	
TOTAL	374 SQ.FT	

❖ Preparation for Leather Grading

(i) Receive Leather



(ii) Check Leather Received against Delivery Documents



(iii) Store Bundle of Leathers in Preparation for Grading



(iv) Un-wrap Leather



(v) Keep the wrapping paper to rue.

(vi) Lay the leather out on the bench. Put all the butts at one end and necks to the other end.

(vii) Continue to un-wrap all the leather.

Incoming Inspection

It is the responsibility of the leather storeroom to inspect, sort, administer, store and distribute upper leather. All incoming materials must be examined to insure that they meet the requirement quality standard. Owing to the high cost of leather a general quality and quantity inspection can save considerable amount of money. Any shortage or discrepancy can be reported to the tannery without delay.

Quantity Check

Upper leather is sold by area, either by sq.ft. Or sq.dm with each batch of leather the tannery should supply a printed list of the No. of skins and their individual area.

It is important to check each delivery for Qty. The skins in each bundle should be counted to ensure that the No. corresponds to that on the delivery list. The addition of the delivery list should be checked and a total addition made for each leather grade and for the total delivery.

System of Leather Grades

- Necessary to assess the actual value of the skin.
- To assess accurately the utilization and quantity of upper to be issued to each individual cutters.
- To control the leather quality based on cutting value arrived at by grading as adjust the section from the suppliers. Leather is grouped into different group according to skin cuttability co-efficiency.
- At time to check by the grid method, the sorting concept of the class limits as feedback to the sorters.

It is recommended to resort the tanners sorting of each incoming shipments to shoe factories own grades e.g. A/B/C etc. For that the shoe factory has to decide on its class limits in terms of cut ability coefficient for each grade e.g.

(A) Grade 97%

(B) Grade 92%

They are used same of the ways leather can be graded and there are variations used within the methods described here. However, it is important that the following operating procedures and standards should be adhered to:

The grading table should be at contactable height and be well lit, preferably next window with no sunshine. The light source should be different mounted so that is causing no shadows and imparts no color fare to the material. Additional light should be situated so that they cost light access the material thus highlighting light swatches as indentations.

Evaluation of leather for cutting and its suitability for footwear manufacturing

Before any leather dispatched/issued to cutters all leather should be checked and evaluated whether its suitability for the required shoe model to be produced. While checking, it is not just simply inspecting the quality of leather instead sorting and identifying the leather as per the shade, grade and types for the required shoe model is very important. common steps to identified and evaluate the leather suitability for cutting are starts before received or buying the whole leather from the tanneries and the inspection shall be continued in the store while receiving from the supplier and before dispatch it to the cutters.

- Random testing: These are conducted in the tanneries before shipping or sign the agreement. Randomly the *sample* is inspected and the whole batch may be pass or fall.
- Incoming leather inspection.
- After received the whole consignment and before it used in production the following should be carried out: The main difference between random sampling testing method from that of reassessment/regrading, in random sampling method only one or two leather from the lot/batch are tested if this tested sample pass the *whole batch* will pass. But while conducting regrading/reassessment of the consignment the whole /piece/ or each of the leather in the batch should be evaluated and checked.
- As per the sample quality and quantity should be checked.
 - ✓ Selection of samples
 - ✓ Substance/thickness
 - ✓ Finish appearance
 - ✓ Feel/softness and stretch
 - ✓ Adhesion of finish
 - ✓ Cracking
 - ✓ Wet and dry rub
 - ✓ Strength
 - ✓ Fading
 - ✓ Water repellency
 - ✓ Chemical resistance

Based on the above criteria's, tried to check the quality of the products of the lot/batch. Based on this the lot will be accepted or reject before the shipment is conducted.

- Re-grading and purchase cost variance shall be conducted.

Reassessing the grade and sorting into a new grade group if required. Re-grading is sorting the leathers in a new grade. Because the received leathers may not have the quality as written grade on the leather so that grouping as per the actual cuttable area of the leather into a new grade (1st

to 5th grade) is very important. The following format is used to calculate purchase cost variance and re-grading of the whole consignments.

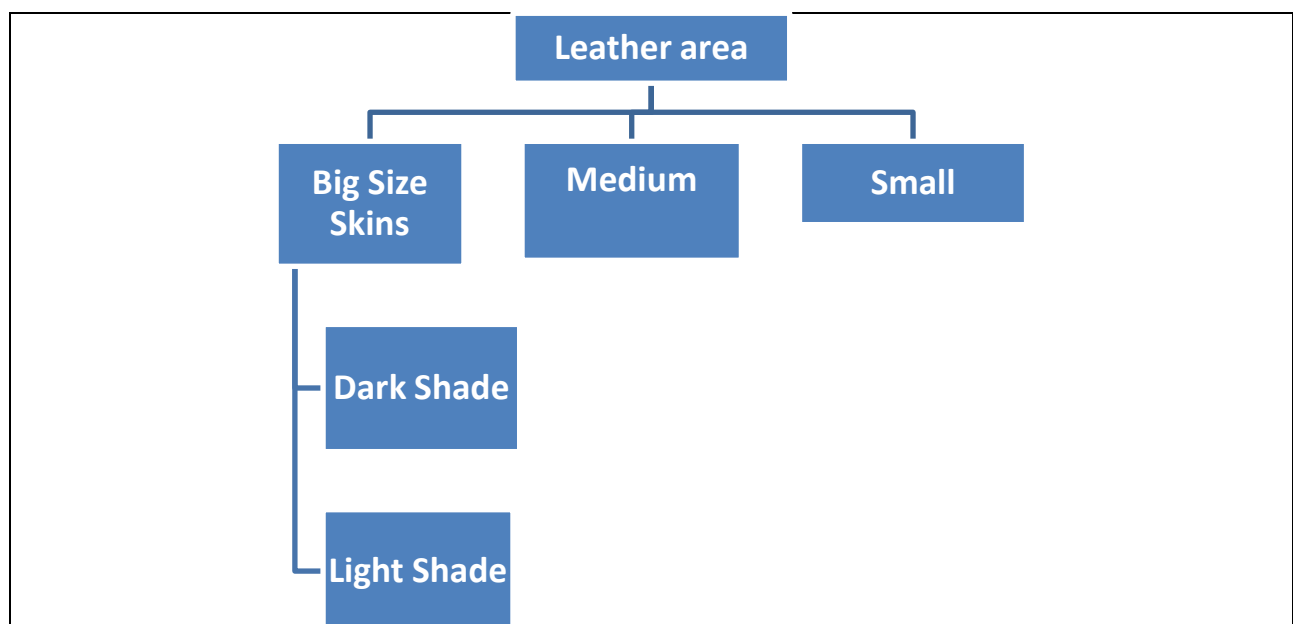
❖ Leather sorting

- Reason for leather sorting:

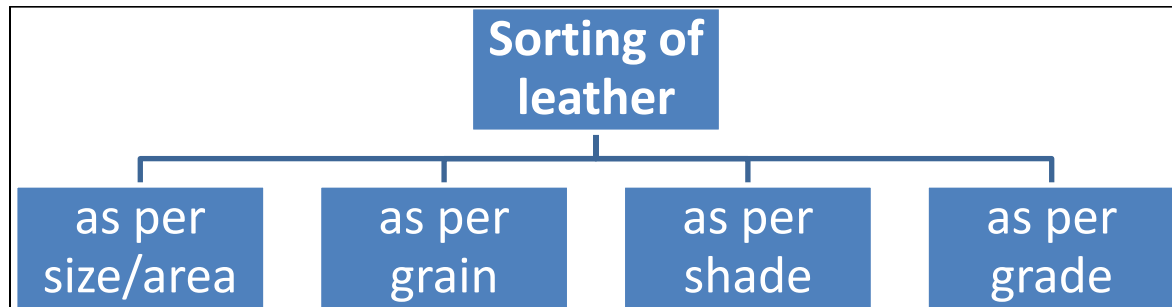
Leather is a natural product and is subject to *variation* from one skin to another, even though most tanneries try to ensure uniformity within batch. In some batches variation may be slight, in order they may be more noticeable. Even variation of leather not only might happened on the same batch of different leathers, variation of grain, color and shade may also happen on the same(one) leather.

- Variation in leather may include the following:
 - a) Color: different skin can show color variation which is a very normal phenomenon with aniline dyed leather.
 - b) Substance: skin of the same area and from the same type of animal can often considerably in substance,(thickness) correct leather sorting will ensure that the various substance can be selected and allocated for different styles.
 - c) Amount of stretch: the direction of stretch does not vary but the amount of stretch does zoning the tanning process the leather can be made finer or softer, which influence the amount of stretch but it is impossible to make the amount of stretch totally uniform.
 - d) Grain: the grain of the leather can vary from skin to skin even within single skins; changes in grain structure can also affect color and dyer glass.
 - e) Defect and marks: these one caused by numerous natural and man-made sources and vary widely in degree.

The sorting is done as follows:



❖ Sorting of Leather Done by a Cutter (If Necessary)



Once a cutter receives material according to his ticket he may sort skins from standard size, grain and shade. This increases his productivity.

- Before starting cutting the cutter must check
 - (i) Knives and patterns
 - (ii) Work tickets
 - (iii) Production samples and production guide

The perfect state of clicking dies has the important task at clicking out. At the check the clicker concentrate on

- (i) Cutting edge quality
- (ii) Dimension (time to time the dies are checked with the master pattern in production)
- (iii) Design
- (iv) Faults

The material is put on the leather horse according to the following rules

- At first he can put thinner leather and thicker ones are put up.
- Color shades are put from the darkest to the lightest ones step by step (for an easier pairing).
- Whole leather is over loaded at the longitudinal axis by grain up and shifted out slightly.

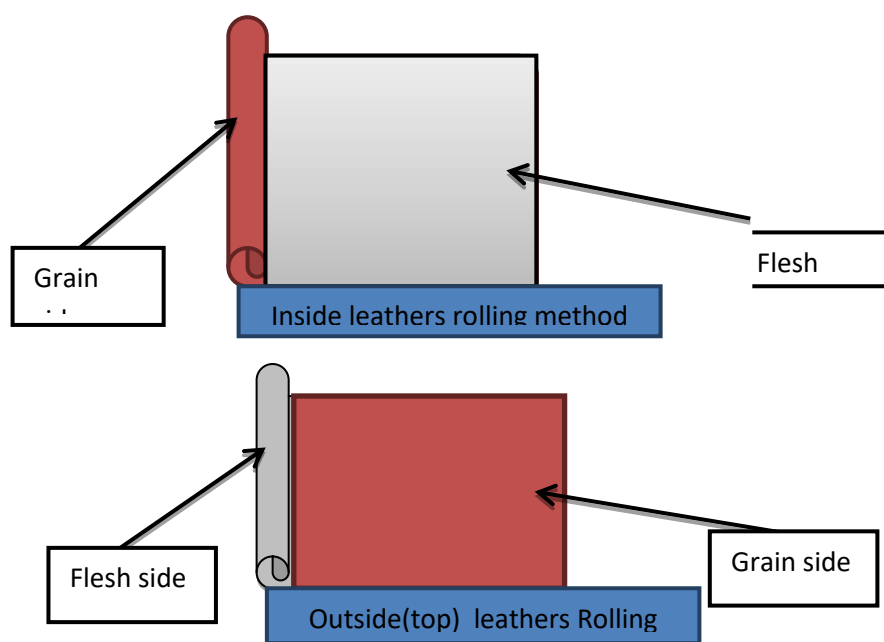
Storage and bundling of leather

Leather storage:

After grading operation is completed, the skin should be stored properly. The leather received in bundles and plastic bags of max of 10 skin of the same grade should be re-bundle for storage attaching each bundle a ticket showing:

- Tannery or supplier name
- Types of leather
- Color
- Thickness
- Quantity
- Grade of leather

Roll/bundle method of leather storage: commonly leathers are stored in the roll/bundle form and 8 to 12 leathers are included in one roll/bundle. Roll method are preferable to utilize the space than stack on method .because once it is rolled/bundled it is possible to keep it on the rack so that more leather can store within the small area/space. But when we tried to store leather using roll/bundle form, we have to be take cure for the leather because grain crack and damaging might happen due to improper rolling, excess bundling of leather together and over lapping of one roll over the others. While bundling, if we use the 10 leather in one bundle, 9 leather roll inside by keeping the grain side of the leather outside and visible and the flesh side inside. The remaining one leather will be on the top of the other nine leathers and rolled in opposite form (flesh side outside and grain side by keep inside.). This leather used as a cover / wrapping leather for the other nine leathers.



Stack on method of leather storage: this kind of leather storage system commonly applicable if the quantity of leather are few or if there is wide and enough space in the store. Stack on or flat method of leather storage is better to keep the leather safely without any kind of damage as compare to roll/bundle method. Usually sheep /goat skin are stored by this method. But if we have the space it also applicable to cow and other big types of leather. Even though there is no standard that have been set before about the number of quantity that have to be stored in stack on/flat form at a time, most footwear factories and even tanneries used to stored 120 – 150 skin/hide once.



Stack on method: laying one over the other.

Avoid various factors that can affect the performance/usage of leathers and its natural property. Proper storage and handling are also including below:

- Temperature: most leather best stored should not be more than 10°C -20 °C temperature. Very high storage temperature may cause finish blocking and finish cracking caused by the finish adhering itself or taking the imprint of the

flesh side of the text skin. Rapid decrease in temperature normally during winter nights may cause space formation. Room with external wall area the most susceptible to such temperature fluctuation and should not be used as leather store. If this is unavoidable some heating in the leather store during the winter months. This reduces the risks of finish cracking, a potential problem when unwrapping bundles of leather which have been stored at low temperature.

- Humidity: the ideal atmospheric humidity level is between 50 – 60% RH. Above this there likely to be an increased risks of mould growth whilst below it grain in cracking can be a problem. In addition since the grain crack resistances of the leathers are relative to its moisture content, prolonged storage in the low humidity environment tends to increase the risk of grain crankiness in lasting.
- Lighting: avoid strong light or direct sunlight. Prolonged exposure of leather to strong light, whether natural or artificial often leads to color changes or fading. in extreme cases it may even cause un-brittleness and loss of suppleness. As a general rule the best types of lighting to use in the skin room defuse day light or some form of relatively weak artificial light source.
- Method of storage: in order to minimize the risk of cracking all leather should be ideally stored flat or hung over a horse. Unfortunately, flat storage more space than is available therefore, they are stored in rolls. It is good practice to restrict the number of rolls that are stacked one on top of other. Particularly if wire storage racks are available since these can inflict pressure marks on the bottom roll if overloaded. Also there should not be excess overlap of leather and suffocation in the store.
- Duration of storage: if leathers are not used immediately, it is not preferable to maintain long time stock.
- Leather storage: Different types of leather (in color, in types, in grain and in size) should not be stored together. Similar types of leather are preferable to keep together.
- Proper labeling: in order to easily identified each types of leather and to distinguish one types of leather from the others proper labeling is required. The label should include the required dates.



- ❖ Problem due to improper storage and handling
 - Grain crack
 - Finish crack
 - Fungal growth
 - Color fades.
- ❖ Leather labeling : include:-
 - Color
 - Leather grade
 - Leather types
 - Number of leather in the bundle(quantity)
 - Total area in the bundle or shelf(total area/quantity)
- ❖ The following data should be record in the store regarding the leather:
 - Stock number
 - Delivery date
 - Invoice number
 - Area
 - Number of skin/hide
 - Grade
 - Supplier name
 - Rate
 - Issued quantity
 - Received quantity
 - Balance/stock quantity, etc...

Financial implications on procurement of leather

Reassessment of the received consignment

Introduction

Leather is a very complex material, which must be subjected to laboratory tests for accurate assessment. This may not always be possible as most tanneries do not have adequate testing facilities and some of the tests are very lengthy for any buyer to wait.

There are, however, a few crude and quick tests, which can help the buyer in taking correct decision. These tests will give a danger signal, regarding the whole consignment, so before buying and simply receiving the whole ordered leather depending only on the tanneries' leather grading system, while receiving the order by using random tests method reassessing is very crucial. Then, after receiving the whole order before using it directly for production, conducting reassessment/re-grading of the whole consignment is important. This enables the footwear factories to re-appeal and give feedback regards of the quality of the leather as well they can be able to complain on the price based on purchase cost variance calculation.

❖ Random test

In random test the following activities are carried out.

- Selection of samples
- Substance/thickness
- Finish appearance
- Feel/softness and stretch
- Adhesion of finish
- Cracking
- Wet and dry rub
- Strength
- Fading
- Water repellency
- Chemical resistance
- ✓ Based on the above criteria's tried to check the quality of the products of the lot/batch. Based on this the lot will be accepted or reject before the shipment is conducted.

1) Importance of reassessment and purchase cost variance calculation:

The one of the main importance's of making reassessment and calculating purchase cost variance for the whole consignment before we start production are tried to explain below:

- ✓ Some of the tanneries would not sell their product as per the agreement. They might try to cheat after the agreement while before shipping. Especially such kind of discrepancy/cheating is commonly happen on the quantity and grade of leather.so that Conducting the Reassessment on whole consignment enables us to know whether we are cheated by our supplier or not.
- ✓ Conducing the reassessment and purchase cost variance calculation can able the footwear factories to complain on the tanneries if area discrepancy and grade variance seen after the regarding.
- ✓ As we said above, reassessment and purchase cost variance calculation help us (footwear factories) to know whether we are cheated by the quantity and by the grade and the data used as a confidential facts and by this we complain, also help us so as to make decision in order to see for the new customer/supplier for the new order. Although, if a big deviation of quality happen on the whole consignment as compare to the sample and from what we expected, this regraded value help us the make decision by this leather we model/article of shoes shall/should be produced.so that we can't just simply discard the whole leather instead we can make decision on to use it for other model or to sell it to others.
- ✓ Sometimes the order quantity and grade of the leather and the actual quantity and grade may be varied. For example if we order 1500 sq.ft of leather on the TR grade (average grade) on the price of 40 br for the 3rd grade. But after we reassessed the whole consignment, the actual value becomes 1440 sq.ft. So we lost 60sq.ft of leather and expect grade value .from this discrepancy on average we loss 1800birr.by regrading and performing the purchase cost variance calculation we able to know the loss and gain of the consignment.so that the management can able to accommodate and redistribute the loss while cost of a product is calculated in preparation of the price. Generally we can say that reassessment and purchase cost variance calculation help (footwear factories) to readjusting the profit margin.

❖ Reassessment of the received consignment

After received the whole consignment and before it used in production the following should be carried out:

- ✓ The main difference between random sampling testing method from that of reassessment/regrading, in random sampling method only one or two leather from the lot/batch are tested if this tested sample pass the whole batch will pass. But while conducting regrading/reassessment of the consignment the whole /piece/ or each of the leather in the batch should be evaluated and checked.
- ✓ As per the sample quality and quantity should be checked.
- ✓ Reassessing the grade and sort into a new grade group if required. Regrading is sorting the leathers in a new grade. Because the received leathers may not have the quality as written grade on the leather so that grouping as per the actual cuttable area of the leather into a new grade (1st to 5th grade) is very important.

While conducting the area measurement and the reassessment of the whole consignment at list the following results shall be recorded:

- Consignment number
- Date checked
- Date of receipt
- Name of supplier
- Total area ordered
- Total area received
- name of leather/material
- Grade/types of leather or quality level
- Average price
- Reassessed/regraded quantity
- Checking result as per the sample(new grade quantity)
- Amount/percentage of area discrepancy
- Purchase cost variance result

Purchase cost variance of the received consignment

Purchase cost variance

Purchase cost variance is just what the name would imply. The difference for an item or service between the amount per unit actually paid and the budgeted amount per unit multiplied by the number of units bought. The purchase price variance of input materials can significantly affect production costs for a manufacturing business that does not have control over the cost of its production inputs.

In cost accounting it's the difference between the standard cost and actual purchase cost. If your standard cost for a component is \$1.00 and you buy it at \$1.10 then the purchase price variance is \$0.10.

A *positive variance* means you are paying more for production and therefore less profitable than plan or simply show loss. If you have a *negative variance* you are paying less than plan and will be more profitable or show the profit. It's used to get a quick gauge of status so that management can address cost of goods quickly. The purchase price variance is the operational result, it is not a cost before that decision/buying

When regrading is completed it is recommended that a purchase variance account be kept to monitor the gains and losses resulting from such regrading.

These records may help to obtain refunds from tanneries or may influence decision to change tanneries or accept a price increase.

Remember: sometimes the cheapest price leather is not the best value for money.

Financial Influence of Leather Grading

To give an *example* of how leather grading may influence the profit or loss of a tanning room of factory

Example:

A complete delivery of locally tanned leather has been delivered to your factory of the following quantity and price.

Quantity = 2750 sq.ft.

Price = 40 birr per sq.ft.

Total Value of Leather = 110,000 birr

On receipt of the leather, the leather grader regraded and while regrading a discrepancy obtained which is different from the expected grade and quantity of leather as shown below:

- Expected grade with respect to price:

Grade	Quantity ratio	Expected quantity
1 st Grade	0.1	275 sq.ft
2 nd Grade	0.2	550 sq.ft
3 rd Grade	0.4	1100sq.ft
4th Grade	0.2	550 sq.ft
5 th Grade	0.1	275 sq.ft

- Regraded quantity with price

Grade	Actual regraded quantity
1 st Grade	170 sq.ft.
2 nd Grade	500 sq.ft.
3 rd Grade	1050 sq.ft.
4th Grade	530 sq.ft.
5 th Grade	500 sq.ft.

- In leather grading, normally the price is fixed on the middle grade and the rates of other grades vary by 5%.

The buying price, that is the price paid by the factory for the shipment would be the middle grade price (40 birr) per material. All grades above this middle grade would increase by 5% in price and all grades below the middle grade would reduce by 5% in price e.g. in the above example, the rate i.e. 40 br prs./sq.ft., is fixed on 3rd or C grade which is the middle grade and the rate of 2nd grade will be 5% more than the middle rate., i.e. $(40 + (5\% \text{ of } 40)) = 42 \text{ prs./sft.}$, and the rate

of 4th grade will be 5% less than 3rd grade i.e., the middle grade i.e., $(40 - (5\% \text{ of } 40)) = 40 - 2 = 38 \text{ br prs./sq.ft.}$

- The rates of different grades in the above mentioned examples are :

Grade	rate	Price per Sq. ft.
1 st Grade	+ 10%	44 birr
2 nd Grade	+ 5%	42 birr
3 rd Grade	Avg. price	40 birr
4 th Grade	- 5%	38 birr
5 th Grade	- 10%	36 birr

- To calculate the value of the leather shipment multiply the graded amount by the price per grade then subtract the total graded price from the actual price paid to the tannery, this would show a buying loss.

Grade	Quantity/sq. ft.	Price per sq. ft.	Value (birr)
1 st Grade	170 sq.ft.	44 birr	7,480
2 nd Grade	500 sq.ft.	42 birr	21,000
3 rd Grade	1050 sq.ft.	40 birr	42000
4 th Grade	530 sq.ft.	38 birr	20140
5 th Grade	500 sq.ft.	36 birr	18000
		Regraded total value = 108,620 birr	

Regraded value is the value or the price worth which the leather is received.

- Subtract the regraded value from the actual price paid *110,000 birr* paid to tannery.
- 108,620 birr actual values after regarding.

$$\text{Result} = 110,000 \text{ birr} - 108,620 \text{ birr}$$

$$= 1380 \text{ birr which is a loss on purchase}$$

since; we have received the material of lesser value (1380 birr) than what we have paid to the tannery (110,000 birr.)

If the actual piece paid was lower than the graded price then this would show a purchasing profit.

Textile (Fabric) Cutting

Textile (fabric) is the term describes any woven or non-woven or knitted materials. Textile (fabric) derived from Fibers. Fibers may be of natural or synthetic (man-made) origin e.g. cotton, wool, silk, jute are the natural fibers whereas, nylon, viscose, Orion etc. are the synthetic fibers. Fibers are produced either as staples or filaments.

Fabrics and other man-made materials are now being used more and more in shoemaking. Brocades have been used in footwear for hundreds of years, but today a wide range of fabrics and non-leather materials enters into the construction of all types of footwear. Textiles in all the well-known natural synthetic categories are specially produced to meet the particular needs of the shoe industry.

Unlike leather, fabric has to be cut in the line of stretchiness.