

ACKNOWLEDGEMENT

At first, I would like to bow my head with respect to almighty Allah who gives me sufficient strength to continue my study and submit this report.

I would like to acknowledge my greatest thanks and indebtedness to my honorable teacher **Dr. KHAN REZAUL KARIM**, Principal in charge, Bangladesh College of Leather Technology for selecting the subject of my project work.

I would like to express my sincere appreciation and the deepest sense of gratitude and indebtedness to my respectable guide teacher **MD. SOBUR AHMED** Lecturer, Leather products Technology, Bangladesh College of Leather Technology for his valuable advice, discussion and intimate co – operation.

I am most great for the completion of my project work to **MD. NOOR MOHAMMAD** HEAD of the department of leather product technology, for assisting and supervising me from the beginning to the end of my project work.

I express my thanks to my friends who directly and indirectly helped me for completion of my project work. At last I am unfortunately not able to include the names of all those who have contribute to perform my project work.

SHOHAG IBNE ALIF
10TH JULY, 2007

Dedicated

***TO
MY BELOVING
PARENTS***

Abstract

Over centuries art of shoe making is getting developed and various methods shoe construction is being popular. Bangladesh is a developing country. The cost of labors is chief. There is a great demand for casual shoe not only in the world but also overall our country. Now-a-days most people want quality type footwear beyond his income limit, also to maintain social status. Quality means degree of attractiveness and zero defects as well. To produce quality type footwear one has to pay careful attention during construction of that product. Also to produce quality type casual shoe needs high quality materials. About 60% gents as well as the different ages of people also use casual type shoe. If we produce attractive type design and better quality product, footwear industry will be more profitable.

In this project work paper, an attempt is made to provide a fundamental concept on the footwear, history, pattern making, choice of last, materials etc.

In this study, I am trying to produce the better quality and cheaper casual shoe. I have used leather for upper and lining materials. As a result the price of the shoe is more or less higher than that of we demand. But if we use synthetic or fabric type material, the price will be cheaper.

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CHAPTER-1

1.1 INTRODUCTION:

Footwear is the major part of wearing. It is also a part and parcel of fashion accessories. Shoe is believed to be best medium to represent one's personality. So people have an obsession with footwear. The other main aspects to wear shoes are for fashion and comfort, which is pertinent to the design and construction method of the shoe. Every construction method has specific features by methods and the resulting footwear.

1.2 AIM AND OBJECTIVES:

Footwear may be considered as a basic needs item following closely in importance, other items such as food, shelter and clothing. In spite of all potential for becoming a major player, in the footwear industry, in the world market, Bangladesh has a very low profile. The basic reason for this low profile are lack of modern footwear manufacturing technology and poor quality, setting off the advantage of raw material skills and low wage cost.

Higher priced footwear demands a few well design and absolute number of quality control during manufacturing. In Bangladesh the maximum quality problems occurs in constructing. Realizing the fact, I have felt a great urge for up gradation of quality in the construction department.

By the project work I Aim:

- To take the reader to the necessary depths of knowledge to control the quality in construction without confusion.
- To emphasis on the quality control to the fresh managerial entrant in the footwear as they cover all the aspects related to proper operation,

maintenance and quality output in simple and straight forward fashion.

- Apart from the managerial level; to give a completeness of understanding even for this supervisory and operator level which we believe is necessary for making a good supervisor or operator.
- The detection of defects is necessary and their correction is extremely important for quality control.

1.3 **METHODOLOGY:**

- ✓ **Review of the relevant literature.**
- ✓ **Making different types of shoe by following every flat lasting method.**
- ✓ **Compare the shoe by appearance & performance.**
- ✓ **Testing of different types seam & sole bonding**
- ✓ **Analysis of the result.**

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2.1 Definition of footwear:

From which the term shoe is originated:

In English the term "shoe" dates back to many centuries beginning with the Angle-Saxon. "Sceo" meaning a foot covering and evolving into "Schewis" then "Schooys" and finally "shoe". The German "Schuh" has the same origin. Through the centuries the word "shoe" has evolved with at least 17 different spellings and some 36 variations of the plural.

Any foot covering made of various kinds of material or combination of materials like leather, canvas, rubber, textiles, wood and synthetics to protect the foot from cold, heat, thorns, hazards etc and to serve as a covering in the form of sandal, shoe or boot. These shall include walking shoes, dress shoes, casual footwear, sports footwear, occupational footwear, casual footwear, orthopedic and surgical footwear meant for the use of babies, children, ladies or gents.

2.2 The purpose of shoes:

The shoe has two primary functions to perform and has acquired through the years other lesser ones.

The primary functions are:

- To protect the sole of the foot from the heat, cold, dampness, dirt, or

roughness of the ground in walking and standing.

- To protect the upper part of the foot if required the leg from the cold, rain, thorns, and other bites. In its simplest form this a bag and material wrapped round the foot and is here given the generic name of moccasin.
- To assist the foot to perform some abnormal tasks. This includes the various sports such as football, Cricket, hockey, running, fishing, and mountaineering, dancing etc. all of which today have their own special footwear.
- To overcome abnormalities in the foot itself, the surgical boot being the extreme example of this, which many shoes incorporate corrective device, some more corrective in name than in fact
- The main purpose of the shoe may be to complete or enhance the remainder of the costume, the primary functions of foot covering and sole protection being subordinate to this.

2.3 The history of Oxford shoe:

This low cut, instep-laced style originated at Oxford, England, in 1640 and is the “youngest” of the eight basic styles. But, its real popularity began when it was in 1740 (the Oxford did not appear in the United States until 1898).

The Oxford was designed to serve as a kind of foot corset. This reduced the “spread” of

the foot, making it appear smaller and trimmer, just as a corset created the illusion of a small, youthful waist and hips. In fact, it was the laced corset that inspired the Oxford.

Up until the early 17th century, most shoes used straps or buckles as fasteners. Infact, Birmingham, England, was the world center of shoe buckles, employing a then huge labor force of 20,000 making shoe buckles exclusively. In 1640, a radical new style, a low black shoe with laced fronts, was mass adopted by the students of Oxford University. The style spread rapidly and the Birmingham shoe buckle industry was devastated, despite pleas to the king to prohibit the new-laced shoes. Late in the country, Thomas Jefferson was one of the first Americans to wear Oxford. His peers for succumbing to "the foppish French Fashion" chided him .while raw hide cords and ribbons had been used as shoe fasteners many centuries earlier, shoe lacings wand the Oxford style, as we know it today did not appear until the middle of the 17th century. Shoe lacings were later to become a small industry. In the latter part of the century on Englishman, Harvey Kennedy, made a fortune of \$2.5 million(enormous in those days) after he patented and introduced the anglet the metal tip at the end of the lacing to make it easier to lace, the shoe. In same century John Bunyan, when he was a prisoner for his controversial view kept his family from starving by hand fixing metal tips to the shoe laces.

2.4 Types of footwear :

Derby:

Most commonly used formal and casual shoes



- ❖ A very wide range of styles can be derived from a derby
- ❖ Unisex
- ❖ Can be identified from the following points
- ❖ Lock stitch or stay stitch.
- ❖ The quarter can be opened till half of the tread line.
- ❖ The vamp and tongue will be on the same ling.
- ❖ In most of the cases quarter will be on the vamp.



Oxford :

- ❖ Most widely used as formal shoes.
- ❖ Unisex.
- ❖ Quarter is locked at the vamp point and hence opening of the quarter is limited.
- ❖ Has an independent tongue which is stitched at the final stage of the upper.
- ❖ In most of the cases vamp will be on the quarter.

Sandals:



- ❖ A popular unisex footwear which is very comfortable
- ❖ The foot is free at the toe and heel.

Court shoe:

- ❖ The sandals serves according to the specific needs as the length can be adjusted with the help buckle.



- ❖ Shoes for ladies formal and casual wear.
- ❖ The top line will be below the vamp point.
- ❖ Can be made in different heel heights.

Slip on:



- ❖ Slip on is also as Pantafola and loafer.
- ❖ As the name indicates these shoes can be slipped in and out very easily.
- ❖ Does not have lace.
- ❖ Can be with or without elastic.
- ❖ Saddle is present in most of these designs.

Boot:



- ❖ Casual shoes popular among kids and teenagers.

Moccasin:

- ❖ Different types of boots are ankle boot, High boot, Knee boot and thigh boot.



- ❖ The most comfortable shoe to wear
- ❖ Expensive as more leather is consumed.
- ❖ Formal and casual shoe.
- ❖ Bottom will be covered with upper leather at the fore part.
- ❖ Hand stitching gives a good appearance

2.5 The classification of shoe (on the basis of various shoes)

As to wearer:

Men's
Women's
Children's

As to adjustment:

Lace
Elasticized
Button or buckle
(fastened)

Step-ins
Goring adjustment
As slippers with no fastening
Leg boots

As to method of making:

Welt
Mc-key
The turn
The little way
The cemented
The stitch down
The pegged
The standard screw

Varieties of work shoes:

Clog
Brogans
Farm
Cowboy boot
Mining
River drying
Larrigns
Lumberman's overs
Wood soles

As merchandise

Staples
Standard styles

Fashions
Novelty Specialty
Casual or play

Sub-classification:

Growing girl's shoes
Boys
Youths
Little boys
Infants

As to purpose

Evening
House
Sports
Work
Casual
Play
Occasional
Open toes
Open back

As to cut:

Bal
Belcher
Stretchable or elasticated
Oxford
Bootee
Step in (slip-on)
Sandal

2.6 DIFFERENT PARTS OF SHOE:

Parts of shoe

Insole

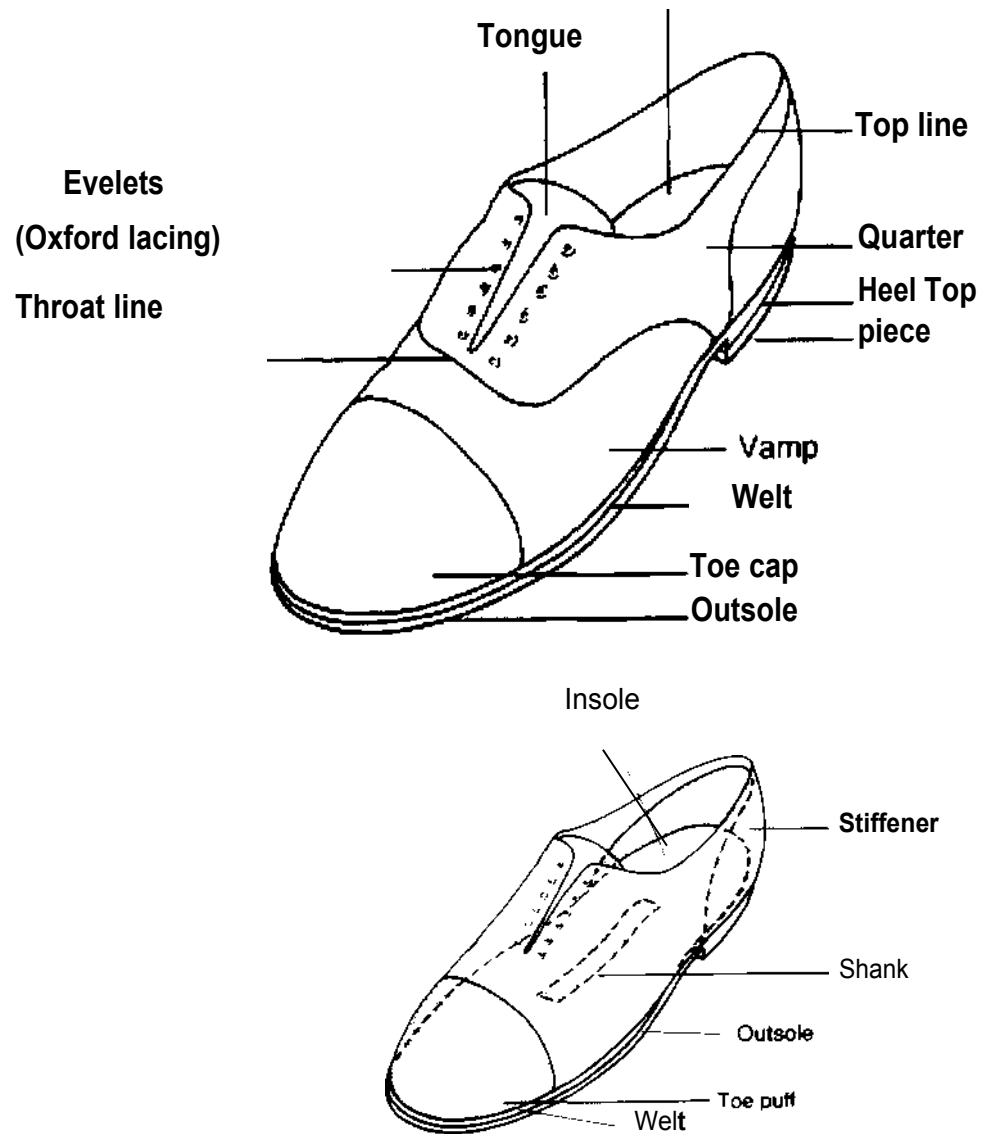
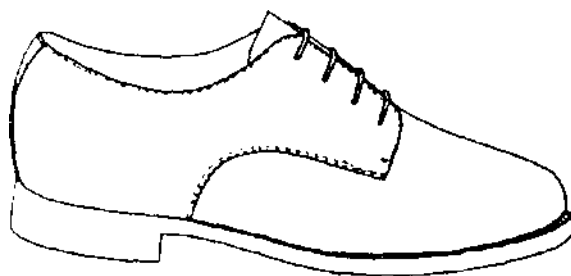


Figure: Different parts of a shoe

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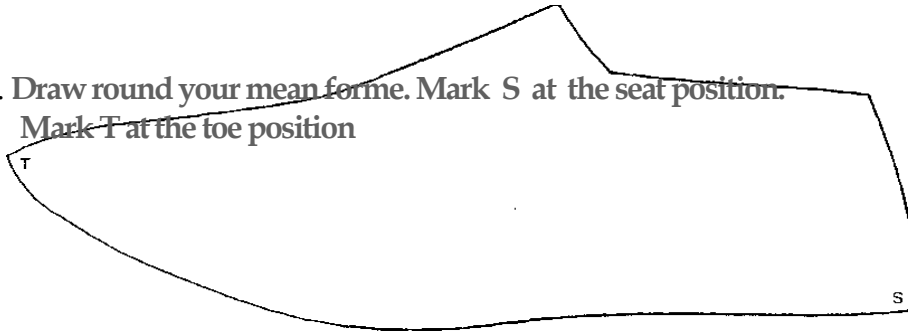
THE OXFORD SHOE

The first shoe to be covered in detail is a classic which has become a firm favorite again in recent times. It is a tie shoe with the vamp stitched on top of the quarters. This is also often used as a basis for the brogue style. You will find that on this and many subsequent pages the term Standard Last Length is used.



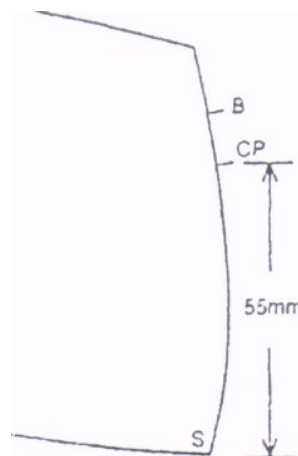
3.1 PRODUCING A MEN'S OXFORD STANDEARD

1. Draw round your mean forme. Mark S at the seat position.
Mark T at the toe position



2. Mark the counter point CP

In this exercise a size 8 is assumed.



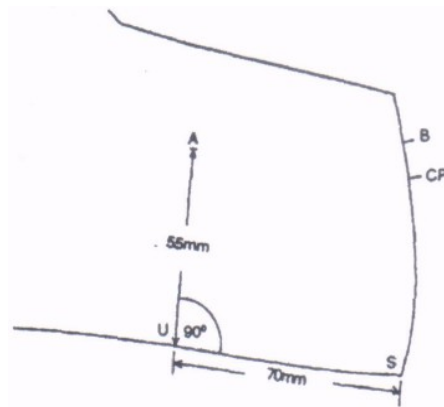
On a six 8 this is $2\frac{1}{5}$ (55 mm) measured upwards from the corner of the seat S ($\frac{1}{5}$ of standard last Length). The increase between sizes is $\frac{1}{16}$ " (1.5mm)

Then mark the back height B which is $\frac{3}{8}$ " (10mm) above CP.

Traditionally the back height is calculated by taking $\frac{1}{5}$ of the standard last length, Plus $\frac{1}{2}$ " (12mm).

Many shoe designers find this produces a back height which is too high. The approach given above normally produces an acceptable back height.

3. To find the side height (under ankle point)



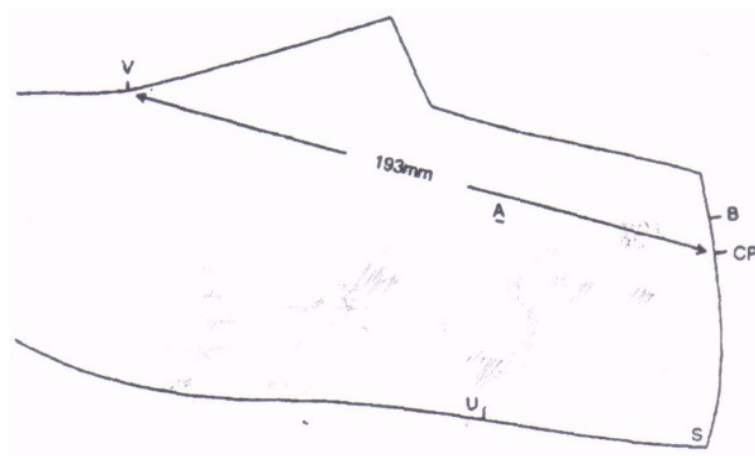
Measure $2\frac{3}{4}$ " (70mm) from S along the bottom and mark point U.

Measure $2\frac{1}{5}$ (55mm) upwards from U at 90° to the bottom edge and mark point A.

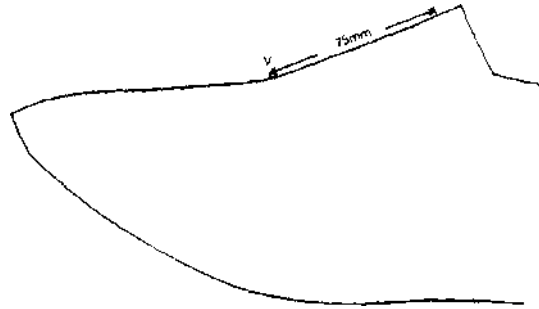
The measurement ensures the quarter in the finished shoe passes comfortably underneath the ankle bone.

4.

Mark the point V, this is 7 % measured forward from CP to a point on the top edge of the forepart.

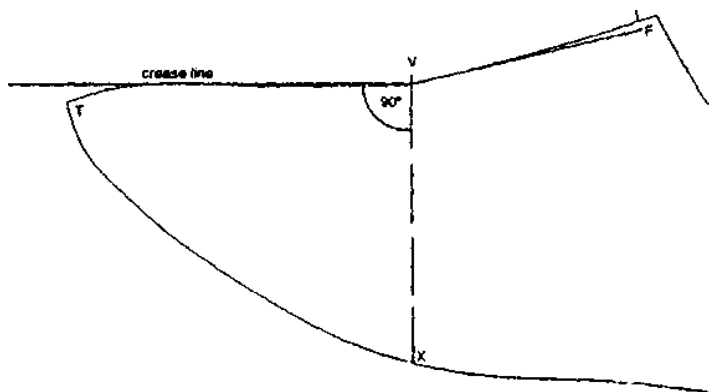


5. Find point I by measuring 3" up the cone from V, 1/16" between sizes.



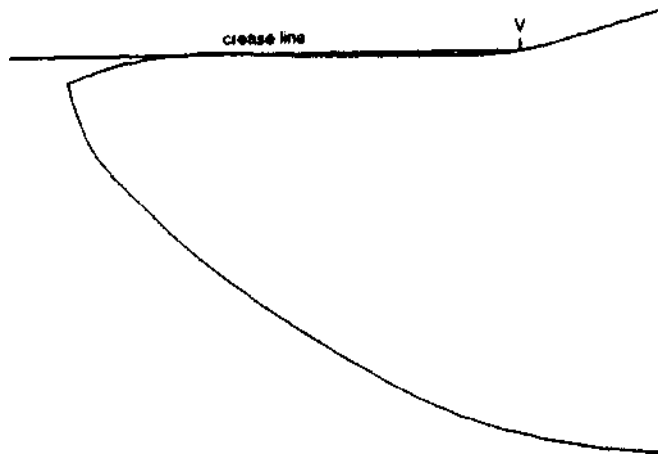
6. Draw in the crease line from V through the top of the toe. This is of course necessary so that a full vamp can later be created without the need for a seam down the front.

7. Draw in line V to X which is 90° to the crease line.

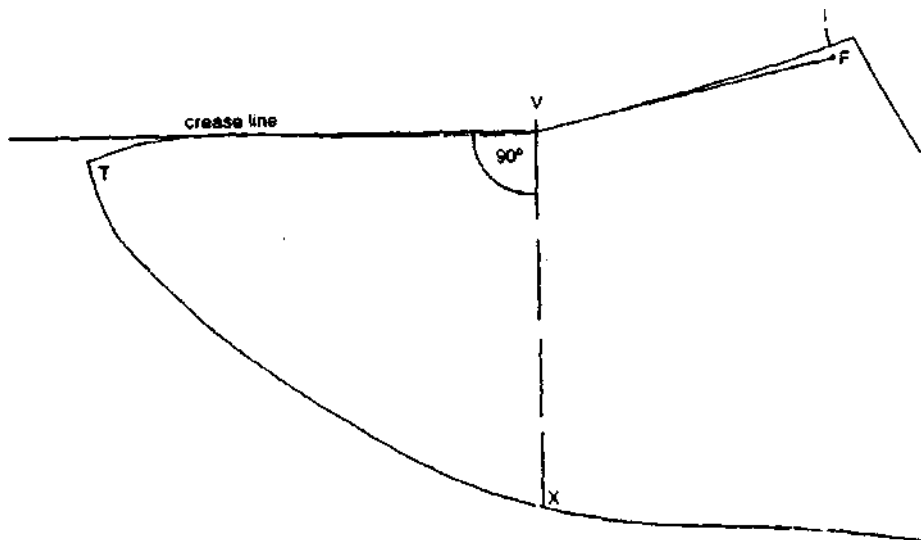


8. Mark point F $1/8''$ inward from 1 and draw a line from this to V. this is to make

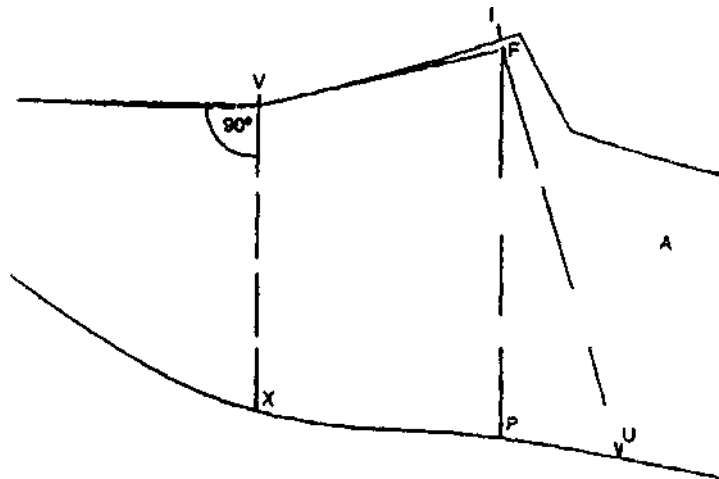
a space between the facings and to allow for adjustment in lacing.



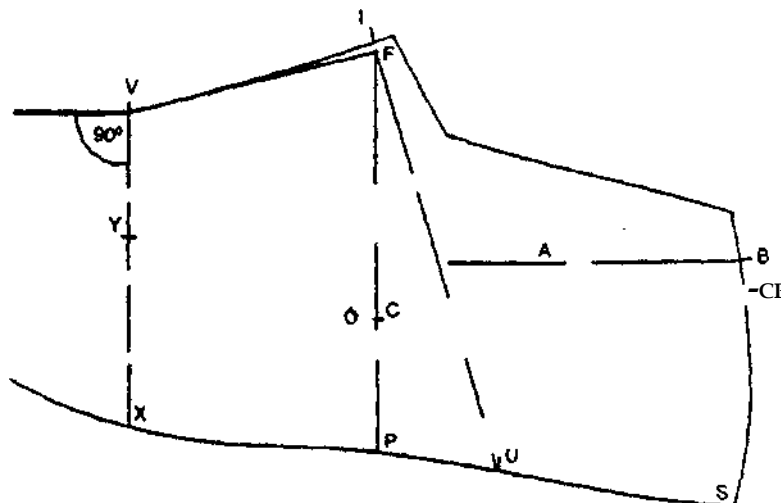
9. Draw the line F to P which is parallel to V to X.



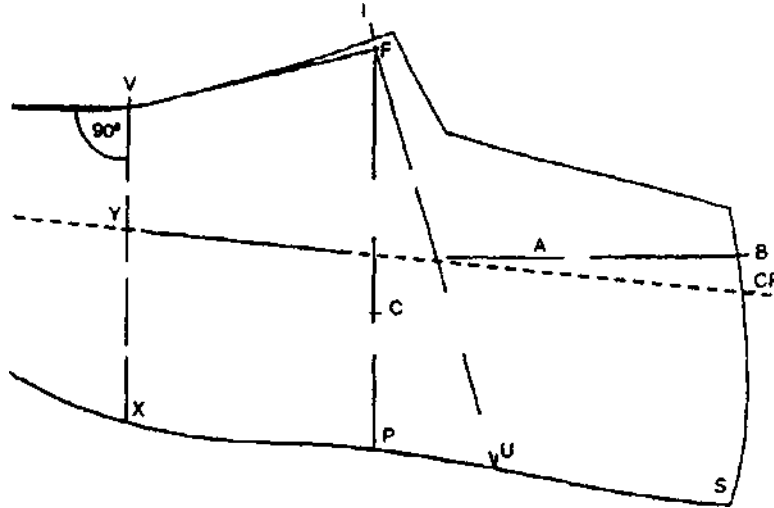
10. Join f to U.



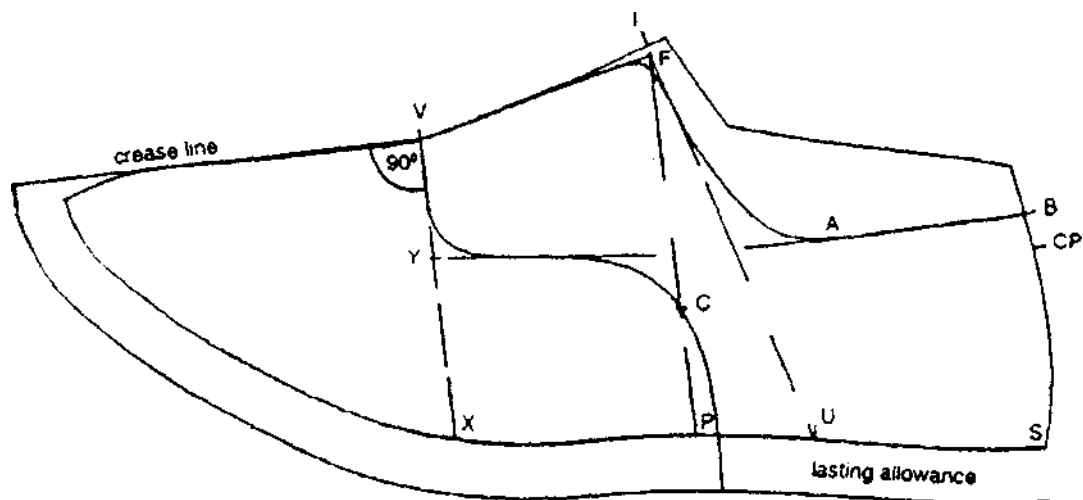
11. Mark point Y. this is $\frac{1}{3}$ of the distance from V to X, plus $\frac{3}{16}$ ". Also mark point C which is $\frac{1}{3}$ of the distance from PL to F.



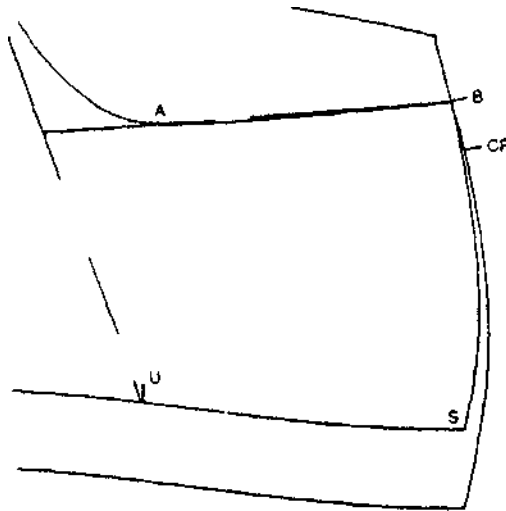
12. Draw in a line from B through point A; do not go beyond line F to U.



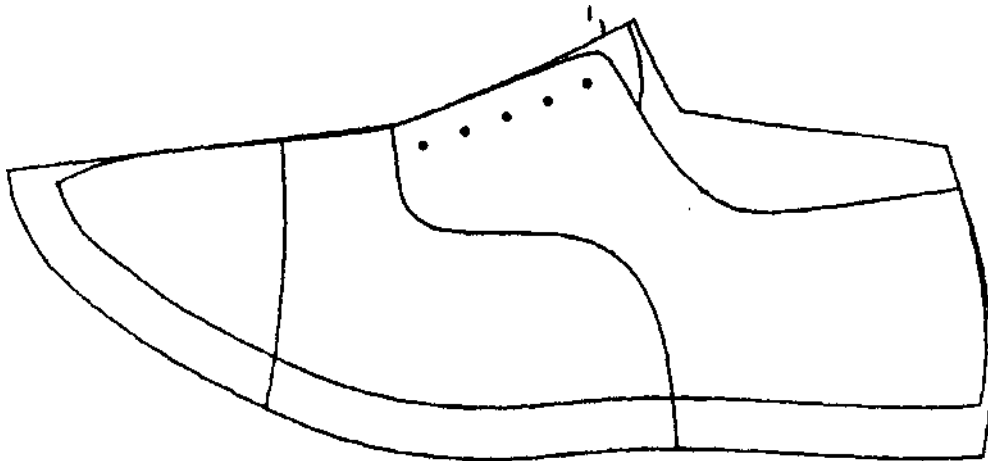
13. Place a ruler on the standard, lining up Y with CP and draw feint line between the parallel lines as shown, i.e. between V to X and line F to P.



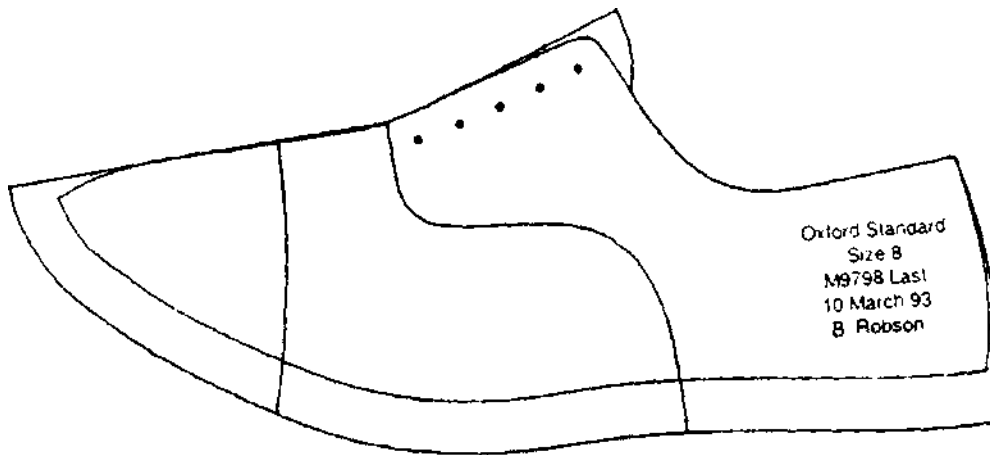
14. Add $\frac{5}{8}$ " lasting allowance to the bottom edge of the mean form using a pair of dividers.



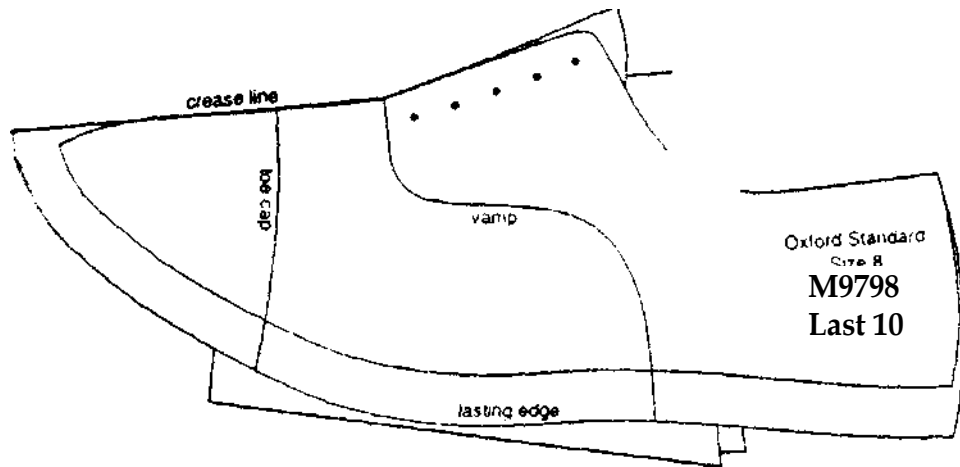
15. Sketch in the top line curve from B through a A founding off the corner at point F. Make the top line curve pass just inside the line F-U as the corner is rounded off to achieve a more pleasing line.



16. Sketch in the vamp curve from V with a radius at Y, passing through C to a point approximately 1/4" behind P.

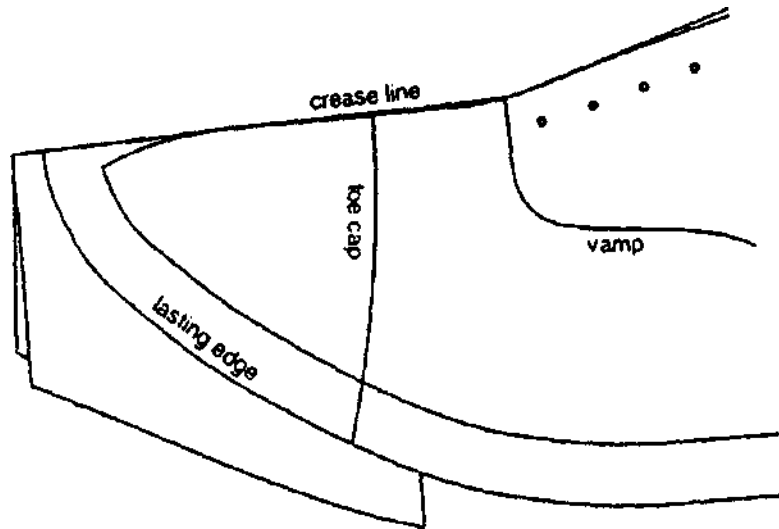


17. Draw in new back curve line to allow space for a stiffener 1/8" away from S. Use the back curve of the mean forme to draw this shape.



Note: it is sometimes beneficial to take the back curve in $1/16''$ at B to give a tighter fitting top line

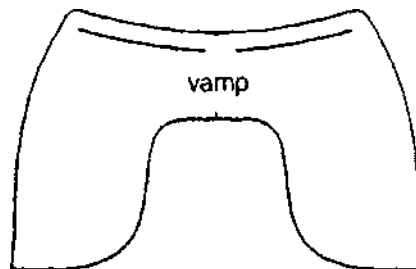
18. You can now erase the construction lines and mark in the eyelet positions $3/8''$ from the edge. You may also sketch in the tongue shape which begins $5/16''$ up the cone from I.



If a toecap is required this should be positioned $\frac{1}{3}$ of the distance from V to T measuring from V and drawn with a 10" or 12 (250mm or 300 mm radius depending upon personal preference and on results after lasting.

Note: the center point for the radius must be on an extension of the crease line,. This ensures the cap line meets the crease line at right angles,. So avoiding a bump when the toe cap pattern is unfolded ,the radius suggested provides an acceptable curve to the toe cap at the sea rime as avoiding the appearance of the toe cap having a dip join the middle, through being made too straight,

1. Vamp



Position the crease line of the standard to the fold line of the paper Mark through the vamp line and the toe cap line

Mark around the lasting edge of the vamp section. Using an awl or pickers to mark round/through the lines will it easier to add allowances later with dividers. Because it provides a path/groove for the dividers to follow.

Remove the standard and add a 3/8" (10mm) underlay to the toe cap line

Then cut the section out, including either stitch marks or pickers for locating the tie cap

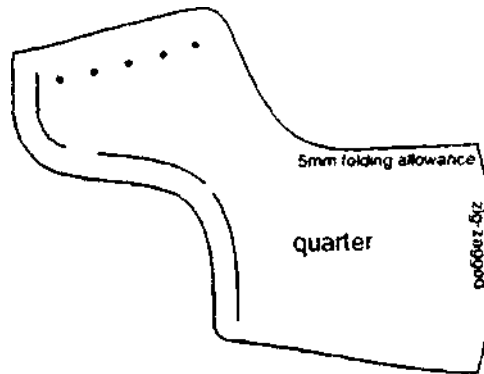
And a center mark in the throat to aid vamping,

2. Toe cap:

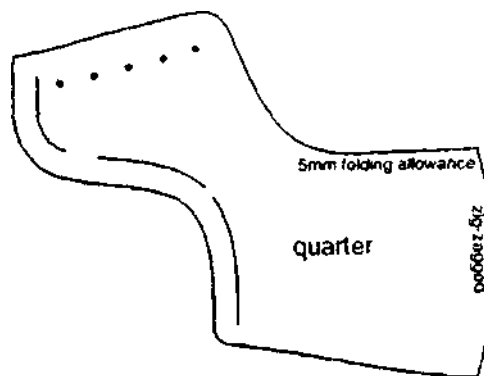


Lay the erase line of the standard against the fold of the paper as shown, Mark through the toe cap line and around the lasting edge of the section.

Remove the standard and cut the section. There is no allowance.



3. Quarter:



Mark around the quarter section of the standard on a single thickness of paper
i.e. along top line, down back curve, along lasting edge and through vamp line

Next, add $\frac{3}{8}$ (10mm) underlay allowance for the vamp seam.

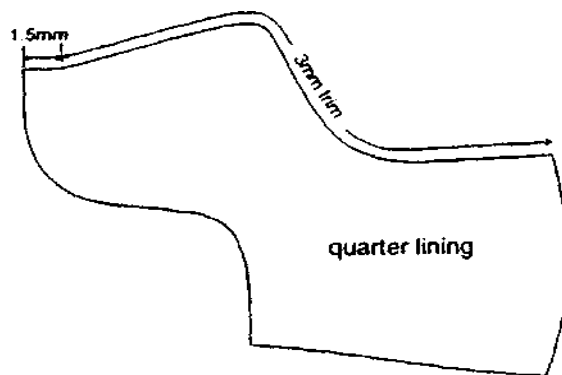
Then add $\frac{3}{16}$ (5mm) folding allowance to the whole length of the top line

Finally, cut slits to indicate the stitch marking position along the vamp underlay line

Note: there is no back seam allowance as this will be a zigzagged (butted) seam

4. Quarter lining:

Mark the lining line on the standard, $5/8''$ (15 mm) forwards of the vamp line.



Then take a single thickness of paper and mark round the outline of the quarter section

Of the standard, however, for not mark through the vamp line, mark through the Lining Line instead

To create a pocket in the lining for a stiffener, the back curve line must be moved

Forwards $3/32''$ (2mm) at the top and $3/16''$ (5mm) at the bottom

Add $1/8''$ (3mm) trimming allowance to the top line as shown in the diagram. Note

That this blends to $1/16''$ (1.5mm) where it meets the lining line.

This small area will be
Seamed not trimmed during closing

5. Vamp lining

Position the crease line of the standard to the fold line of the
paper Mark round the
Lasting edge of vamp section

Mark through lining line

Remove the standard and add 3/8" (10mm) underlay to the lining
line of the section
Cut the section out and cut stitch maker slits into the lining line,
including a centre Mark.

6. Tongue

Place the standard to the fold line of the paper as shown and
mark point V;
Then draw in the shape of the top end of the tongue

Remove the standard and design the rest of the tongue shape to the dimensions
shown

You will notice that the width of the tongue is 1 1/2" (32mm) at its widest point,
which

Occurs approximately 7/8" (22mm) forward from the top end of the tongue, It
extends

5/8" (15mm) beyond V and in 1/4" (12mm) wide at this point. The width

measurements

Are taken downwards from the fold line, the full width of the tongue being twice the

Amount shown.

7. Back strap

Using a piece of folded paper, make the length of the backstrap the same as the back Curve of the quarter sectional pattern, the shape shown here is typical of that used In the industry. But styles vary.

Make the backs tap :

- ❖ 9/16" (14mm) wide at the top
- ❖ 5/16" (8mm) wide at 1/3 distance down from the top
- ❖ 3/4" (18mm) wide at the bottom

Remember to write full details on your patterns of:

- ❖ Description
- ❖ Size
- ❖ Pattern/Last number
- ❖ Today's date
- ❖ Your name

Also write the appropriate name on the edges of each section where an edge

Treatment allowance has been added, e.g. folded.

This completes the sectional patterns for a loose lined Oxford.

3.2 METHODS OF SHOE CONSTRUCTION

BASIC SHOE CLASSIFICATION

Footwear from all ages and all countries can be classified into five types, usually clearly defined. Of these the two basic types are the sandal and the moccasin, the third type is the direct combination of sandal and moccasin, while the fourth, Although superficially resembling the third and derived from it, has in fact quite important constructional differences which entitle it to a separate classification. The fifth type is also a class on its own in that the shoe is either moulded from the liquid or carved from the solid into the required hollow shape and does not require an initially flat material as do the others.

Thus we have:

Type I: The sandal

Type II: The Moccasin

Type III: Moccasin/Sandal combination

Type IV: Modified Moccasin/Sandal or the Shoe proper.

Type V: Moulded or carved footwear.

The majority of shoes worn today are Type IV and their construction is dealt

with in detail in the following chapters. Type V footwear including the most primitive Wooden shoes and the most modern injection moulded plastic ones are

outside the scope of the book.

The shoe:

It has been suggested earlier in this section that in hot climates the foot requires a sandal and in cold climates a moccasin. Climate, however, not only varies from one

part of the world to another- it also changes within a country particularly where the country has considerable variations in heights above sea level.

Thus in mountainous regions, the moccasin is found while nearer the sea the sandal may predominate. The inevitable mixing of the people both nationally and internationally, results in a mixing of footwear types and so many countries can show a complete range starting from the sandal and passing through transitional types with an increasing number of straps over the foot until a completely closed upper is reached and we have a shoe or, starting from the other end the moccasin, with increasing care and craftsmanship in the preparation and construction of the foot bag and the addition of an extra sole, produces the same result.

The shoe then appears to be the logical outcome of the marrying of the sandal and the moccasin. It is possible that the shoe of Western Europe is the result of the mingling of the sandal worn by the conquering Roman legions and the crude moccasins of the tribes they fought. Confirmation of this theory is found in a number of the Roman-British shoes in Guildhall Museum, London, which are quite clearly true moccasins since they have the uppers passing under the foot but with the under part sandwiched between sole and insole derived from the snail, the whole being nailed together. This specialized type of construction combining types I and II can be classified as Type III and is still used for some shoes and

slippers.

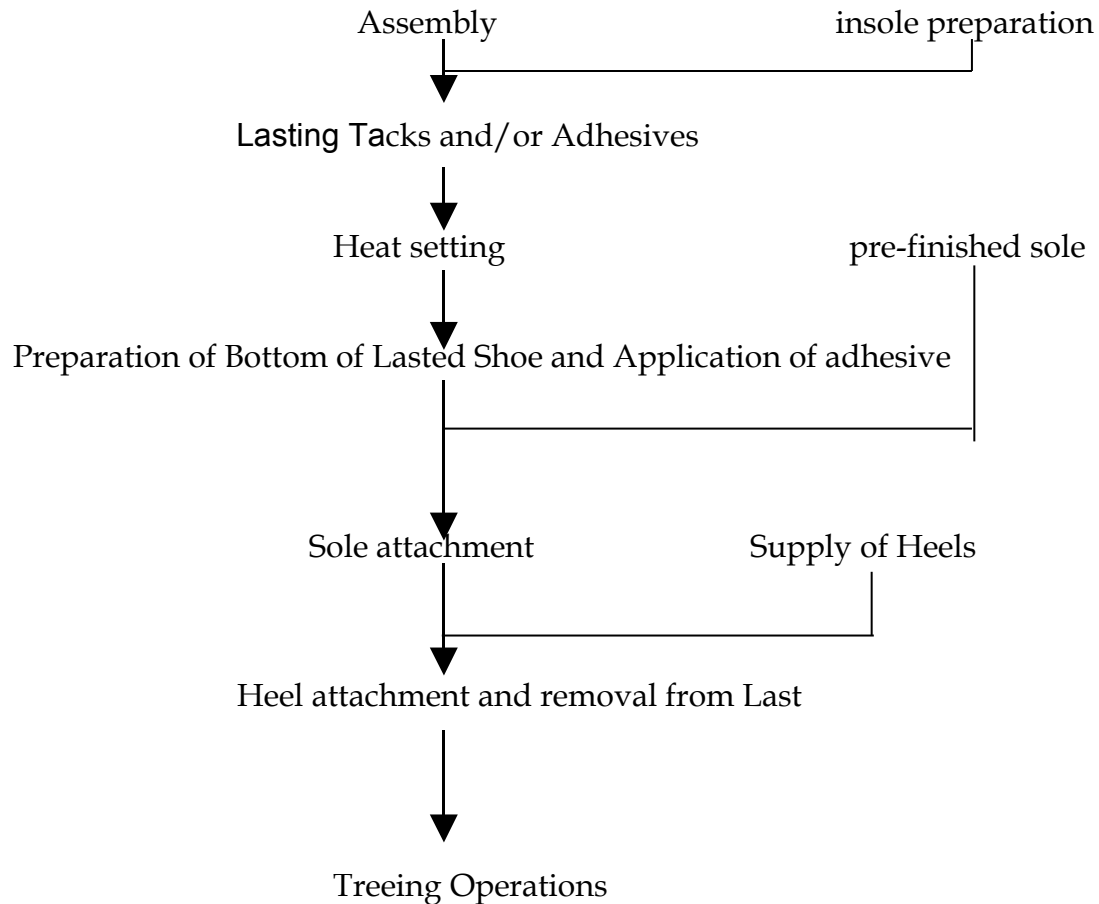
The next logical step would be to use an upper without the under part and join it rounds its lower edge to the sole. This produces a shoe proper of the type IV construction and is capable of infinite variation in the method of sole/upper attachment. Again, it is represented in the Guildhall Roman collection by nailed specimens.

The union of sole and upper or in modern trade terms, the attaching of the bottom to the upper of a shoe is another fundamental process of shoemaking as it has been known for hundreds of years and the whole of part VI of this book is devoted entirely to it. In this present section, however, it is intended only to indicate the general principles involved and to summarize the modern methods so that the would-be designer will be aware of the problems which arise.

3.3 FLOW CHART FOR METHODS OF CONSTRUCTION

This chapter is intended to provide the student with a quick easy reference to the basic sequence of operations required for each method of construction. A more detailed explanation of each process is contained in later chapter.

Cemented construction using pro-finished soles:



3.4 CEMENTED CONSTRUCTION

In recent years there have been many development in machinery used for lasting in the cemented construction. The result has been that cemented lasting has been considerably simplified. Many firms now completely last the shoe in three stages. There are many systems available, this being of react advantage to the footwear manufacturer as he can select a system which is suitable for his particular product. Factor such as heel height, waist curvature, whether it is lasting for man's women's or children's work will all have a consideration.

Upper and insole cementing:

Cement is applied to the lasting edge of the upper and to the insole before lasting/ the cements used are generally neoprene applied by roller-type machines. Where hot-melt adhesives are being injected during the lasting operations this cementing operations unnecessary.

Insert Stiffeners:

A flat or semi-moulded stiffener of the type described in the section on stiffeners is usually employed, i.e. fiber-board or fabric-based material coated or impregnated with thermoplastic resins.

The stiffener is inserted between the upper and lining in the heel area. Alternatively, the stiffener may be stitched into position in the upper.

Back moulding and Seat lasting:

This operation may be carried out either on or off the last. Essentially, the uppers are pre-heated to soften the thermoplastic coating of the stiffener, the quarters are moulded to shape and the seat is lasted to the insole, which has also been pre-heated. Off the last back moulding requires the use of expensive, precision made moulds in sufficient sizes

To meet a particular size range. Some of the machines on the market use hot melt

injection so the insoles and uppers are not pre-cemented. Also some machines have left and right operating heads whereas some have one head which can be alternated for left and right feet uppers.

The basic steps of the operating cycle for one upper are as follows :

The upper is placed into the pre-heater for a pre-set time at a pre-determined temperature. If not melt is not being used the insole is also pre-heated. The upper is taken from the pre-heater and placed on to the mould where the vamp is clamped into position. The upper must be correctly balanced for back height and seam positions. Heel to toe tension is imparted into the upper by means of the clamp. The insole is positioned on one or two locating pinsetter would. The complete assembly this moves up into an inflatable seat band. On being inflated the band holds the upper under pressure while a pair of heated wiper plates moves inwards so causing the lasting allowance to be stuck down firmly to the seat of the insole. After a pre-seat time dwell the plates release and the complete unit moves back to the start position where the upper can be removed.

The moulds are chilled to 0°C in order to ensure rapid set-back of the stiffener material.

Alternately the operation may be carried out on the making last so dispensing it's the expensive mould previously mentioned. In this case hot melt is also normally used, the insole being tacked on to the last before the operation

The correct result must be:

- 1) Back height correct
- 2) Back seam central, upright and straight
- 3) Well molded seat and quarters
- 4) No creases at feather edge.
- 5) Linings cleared well stuck down and not marked
- 6) Lasting allowance well stuck down
- 7) Quarters not marked
- 8) Top lines correctly balanced.

Insert Last and Tack-on Sole:

The last is inserted into the partly lasted upper so that the insole can be accurately positioned to the feather edge and tacked on with one tack in the toe area. Where difficulty has been experienced with inserting the last into a lace-up design the shoes are not laced in the closing room but are secured with a plastic lace clip.

Forepart lasting:

Forepart lasting machines were first introduced to the trade in this country during the mid 1950s. This was one of the major instances where a new machine was designed to incorporate more than one operation. Since then this has been one of the areas of greatest development in lasting.

Today forepart lasting machines have sophisticated systems which allow the operator to carry out adjustments by the turn of a knob, the pull of a lever or by operating a switch. However, the operator still has to use a degree of skill in accurate positioning of the upper into the machine. Providing this is done correctly and the machine is properly adjusted, then the machine carries out the rest of the operation. The upper and insole may be pre-cemented alternatively; a hot melt system can be built into a number of machines.

The essential steps in the operating cycle are:

After conditioning, the upper is initially stretched over the toe of the last in a device known as bench pincers. The upper is then placed into the machine so that the lasting allowance can be gripped by a series of machine pincers. The insole and last are supported on a last support and insole stabilizer. As controlled rate into the upper. The result is that the upper is correctly drafted into positioning over the last. A Teflon-coated toe band then engages around the toe area holding the upper securely against the last just above the feather edge. Following this stage, heated metal wiper plates or

blades move inwards in a horizontal place under the bottom of the forepart so wiping the upper material against the insole and sticking it down securely, careful timing of the machine causes the pincers to release fractionally before the final wiping action ensues that the lasting allowance is pressed flat to the insole. After a pre-set time dwell the forepart-lasting shoe is automatically released from the machine.

The correct result of these operations must be:-

- 1) Vamps firm and tight to wood
- 2) Uppers matching as pairs
- 3) Top lines tight and correctly balanced
- 4) Toe shape correct to last
- 5) Even lasting allowance and flat to insole
- 6) Upper securely stuck to insole
- 7) Correct vamp depths
- 8) Tabs or fronts square.

Waist lasting:

The waist may be lasted by one of a number of methods.

a) Hand method:

With pre-cemented insole and uppers the cement can be activated, the upper pulled in by hand pincers and hammered down.

b) "kambprian" cement side lasting :

Named after one of the early types of cement side lasting machines. The upper is gripped by twin fullers which turn it down to the waist while a further roller, parallel to the insole, secures the upper to the insole waist. Pre-cemented work may be used alternatively; a machine having hot melt extrusion is commonly used. A variety of machines employ very similar techniques to that described although they are supplied by different manufactures.

c) Automatic side lasting:

In recent years we have seen the development of "2 machine" lasting systems, comprising usually a forepart lasting machine plus a combination seat-lasting / waist lasting machine. In this case, the waist of side lasting is carried out automatically by a pair of tapered rollers working simultaneously, while the shoe is held for seat lasting. At the time of going to press, these machines are undergoing constant improvements, modifications, etc. the logical aim of all the research being carried out currently would seem to be the one-machine lasting system or even the one-machine lasting and attaching system.

d) "consol" Side lasting:

Some manufacturers still prefer to use tacks in the waist, particularly for high-heeled work or for heavy materials. Tacking also prevents insole delaminating which is a danger with cement side-lasting techniques. The major machine used for this operation is the BUSMC. "Consolidated Hand Method Lasting Machine" commonly known as the "consol". A pair of angled pincers which can be adjusted for strength and direction of pull, grip the lasting allowance in the waist and pull it inwards over it the insole against pressure exerted by the operator. A carrier block pre-fed with a single tack, wipes forward and holds the upper down firmly on to the insole as the pincers release. An angled driver rod now drives downwards in a hole in the carrier block so striking the tack home through the upper into the insole. The point of the tack as it pierces the insole is clinched over on the metal last plate. A row of tacks is driven in along the waist of the shoe approximately 12mm apart and 9.5mm in from the feather edge.

The correct result must be:

- 1) Upper tight to wood
- 2) Upper bonded or tacked securely or tacked securely to insole
- 3) Tags correctly spaced
- 4) Tacks correctly driven
- 5) Top line correctly balanced

3.5 ATTACHING FOR CEMENTED CONSTRUCTION:

The preparation of the shoe bottom and shoe is highly critical if a good bond between sole and upper is to be obtained.

Due to the variety of upper and sole materials available today the method of preparation chosen will vary considerably. However, that method must be suitable for the upper, sole and adhesively system involved.



Preparation of the shoe bottom:

The method chosen is dictated by the upper material involved.

E.g. Grain leather can be roughed using a wire brush or an abrasive role.

Suede leather will be lightly roughed as above.

P.V.C Coated leather will be roughed.

Bottom Roughing:

This operation involves the removal of the grain and finish from the complete are of lasting allowances by means of a wire brush or abrasive. The wire brush can be of crimped, single steel wires which may be bonded together in vulcanized rubber or unbounded and held together firmly by clamping plates to prevent the brush spreading in wear. Alternatively the wires may be of twisted brass. Where on abrasive is used it is usually garnet or aluminum oxide.

It is essential that a good feather line is determined so that the sole can be accurately bonded of the upper with little or no roughing visible. The operator must be able to judge the exact depth of roughing necessary for the type of material being roughed. This is a critical factor as it is essential that the operator should only remove the finish and grain so that short regular fibers are exposed. This presents an ideal surface for a good strong bond. It is usual for and pleats in the lasting allowance at there toe to be sanded flat on and abrasive roller before roughing the shoe bottom.

The correct result must be:

- a) All grain surfaces removed over entire lasted margin.
- b) Roughing not to extend over feather edge.
- c) No excess toughing or damage to feather edge.
- d) No burnt areas.

Solvent Wiping:

Where roughing may damage the backing fabric on P.V.C. coated material the bonding area may be solvent wiped with M.E.K... This effectively removes migrated plasticizer from the P.V.C surface as well as other contaminants so enabling the adhesive to Key to the surface.

Flat wheeling:

Alternatively, a rotating flat wheel may be used. The frictional effect causes a fine layer to be removed so giving a clean surface to be bonded.

Shank attachment :

As mentioned previously in "Insole preparation for cementing construction" it is more common practice for the shank to be attached by rivets or eyelets at that stage. However, some manufacturers still prefer to attach the shank after bottom roughing. The available methods are the use of tacks, staples or both melt adhesive. The shank is attached to the insole back part through the centre of the waist. Accurate positioning is essential so the shank does not protrude over the joint line on which the ball of the foot pivots. Also there must be sufficient shank to fit under the heel or undue strain on the heel breast areas can result with consequent fracturing of the insole at this point.

The correct result must be:

- a) Correct shaped shank used.
- b) Shank correctly positioned
- c) Shank securely attached.

Bottom cementing:

The two main types of adhesive used for Otto cementing today are neoprene rubber or polyurethane with the latter being the more important. A great variety of these two types is marked by adhesive manufacturers, each variety being suitable for specific or general applications. The footwear manufacturer consequently has to carefully select the particular adhesive for the materials he is using.

The adhesive can be applied by hand brush, a pressure extrusion brush or by a roller type machine.

The preparation procedure must be thorough. Fresh cement of the correct viscosity

and scrupulously clean equipment are both vitally important. With some types of material a primer coat of adhesive with a lower viscosity is used to give increased penetration into the fiber structure of the upper. The second coat of the correct viscosity is then applied. It is essential that the cement be allowed to dry completely to evaporate all of the solvent content. If this is not done the adhesive layer may not reach the full bond strength which is intended for it.

Drying methods vary from drying on open racks to drying in heating cabinets or tunnels built over conveyors.

The correct result must be:

- a) Even application of cement over the shoe bottom.
- b) No missed patches.
- c) No pools of cement.
- d) No cement over feather edge.

Attach Filler:

On the majority of direct stuck shoes cavity remains within the perimeter of the lasted upper which needs to be filled to a level surface. This can be done by using pre-shaped fillers of felt, foam or scrap upper leather which are simply stuck to the insole using the bottom cement. In some cases, the filler may be stuck to the sole instead or occasionally this is made with extra substance in its centre, thus obviating the need for filler. It is important that the filler is of correct substance and size and is positioned.

3.6 SOLE PREPARATION

- ❖ Scour surface lightly

- ❖ Use of brushing operation to remove all traces of dust.
- ❖ Apply special EVA primer by brush. Ensure a minimum of 10 minutes between wiping and cementing. Or prime with Isocyanate solution.
- ❖ Apply polyurethane (PU) adhesive.
- ❖ It is important that the cemented sole be allowed to dry for at least of 30 minutes before sole pressing.
- ❖ Heat reactivates the adhesive film to 85-90 degrees Celsius. When using special EVA primer, correct heat reactivation of the adhesive films a must.

SPECIAL EVA PRIMERS:

Ensure a minimum of 10 minutes between wiping and cementing for a special primer but apply cement before the end of the working day.

ISOCYANTE SOLUTION:

Ensure a minimum of 15-30 minutes between priming and cementing. (Isocyanates are chemically quite reactive and are used for changing the surface of materials such as rubber)

3.7 OPEN TIME FOR SOLES BETWEEN CEMENTING AND HEAT REACTIVATION:

Minimum 30 minutes (some adhesive may require longer to dry) Maximum within working day.

Follow your supplier's recommendations :

The result must be:

- Sole correctly positioned on shoe.
- Sole securely stuck to specified standard.

Last Slipping:

When the shoe has cooled the last is slipped from the shoe either manually or by machine. Care must be taken that the top line or seams are not damaged or broken.

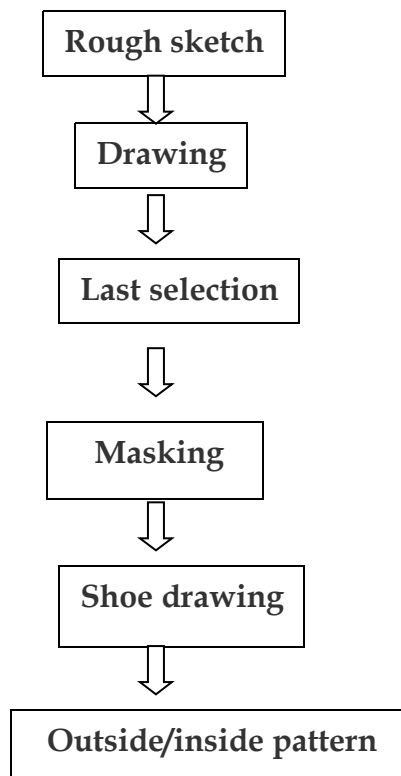
Heel attaching:

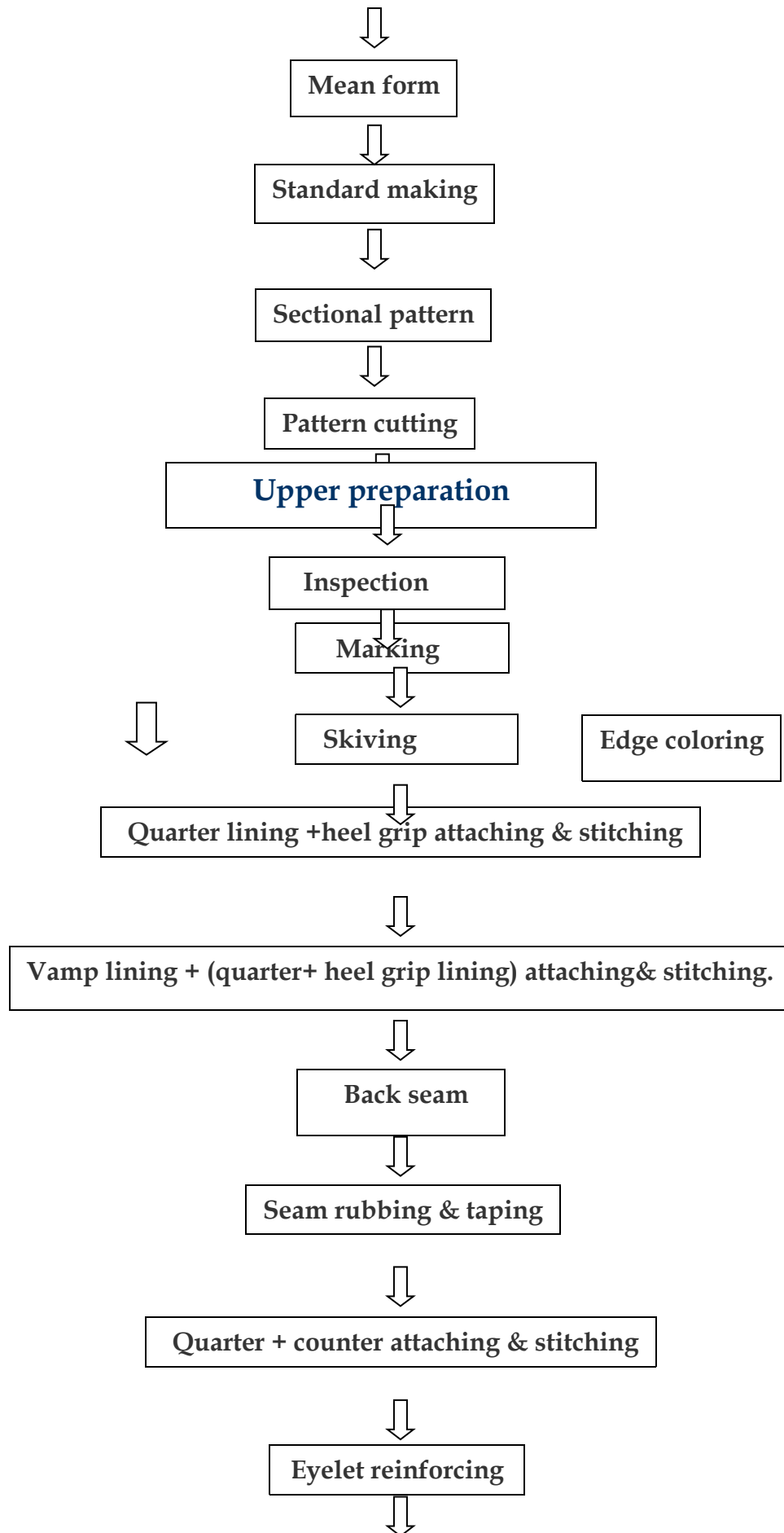
The method normally used with the cemented construction is inside heel attaching. The exception is on men's shoes carrying a built heel. Heeling nails are automatically fed in a pre-set pattern into a nailing stand. The shoe is placed in an inverted position over the nailing stand and the heel is clamped into the correct position on the shoe seat by the first pressure on the machine treadle. A second pressure causes the nails to be driven through the insole and into the body of the heel. An average of 4-6 nails is used.

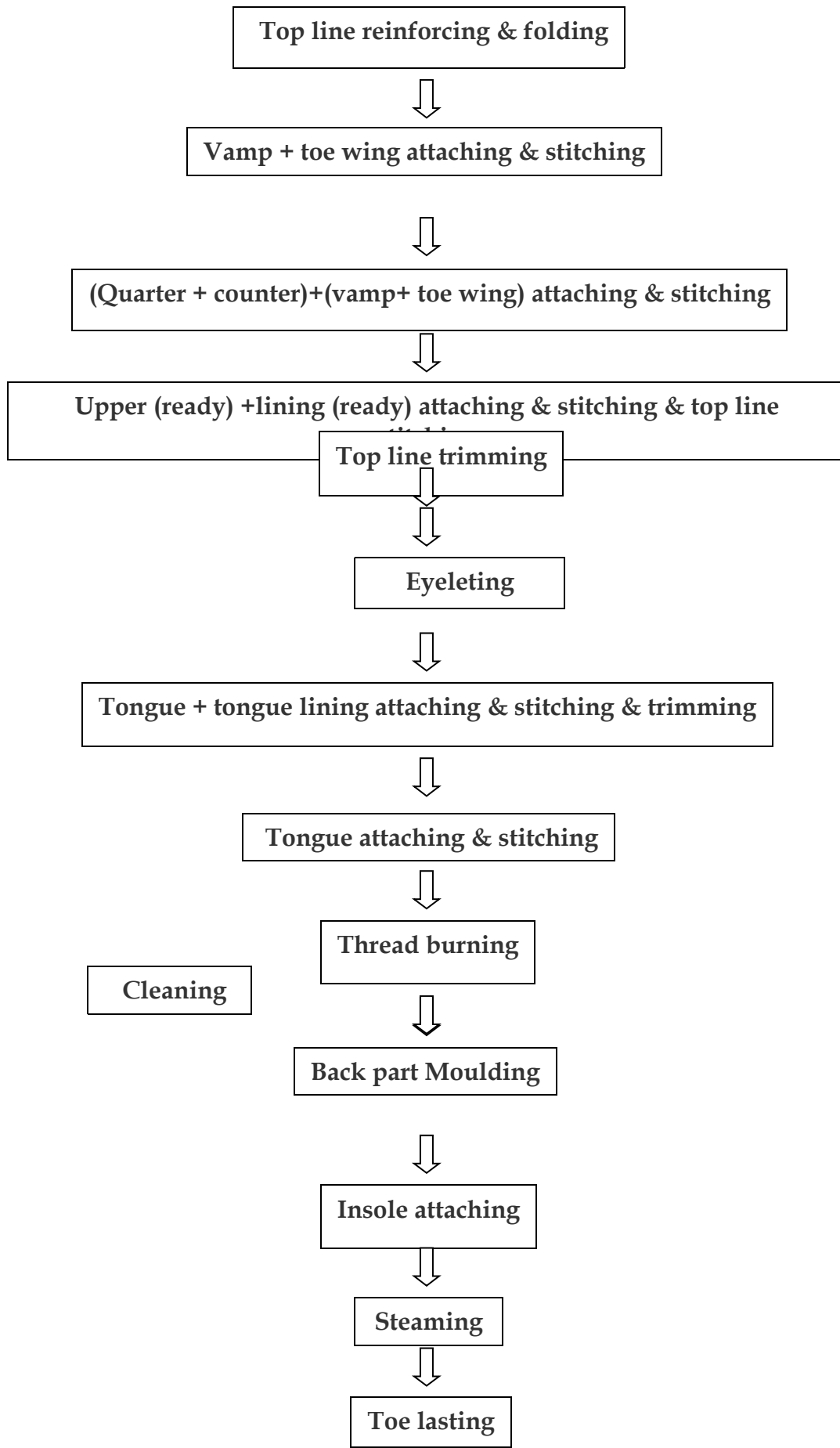
The correct result must be:

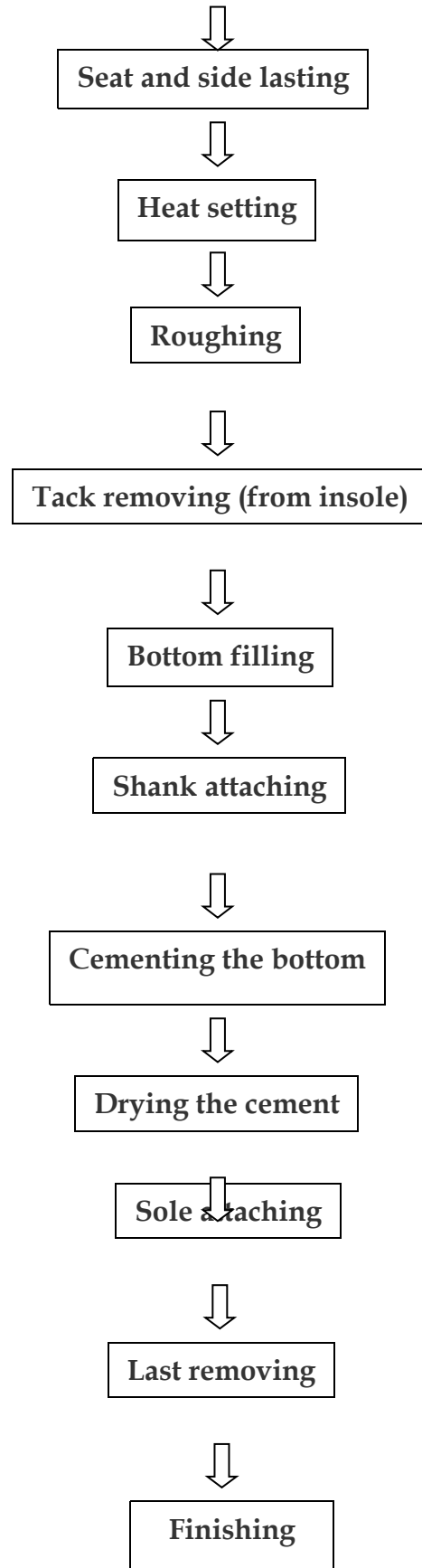
- ❖ Heel positioned correctly to give an uninterrupted back curve.
- ❖ Front of heel square to sole.
- ❖ Correct toe spring and heel pitch
- ❖ Correct number and pattern of nails.

3.8 Operational Sequence of Oxford Casual Shoe manufacture









3.9 Materials used in this product:

Upper:

Lining:

Bottom section:

Component:

Heel
Filler
Sole
Insole
Sock
Wooden
Shank
Toe puff
Stiffener

Material:

Rubber
EVA
PVC
Cellulose board
Synthetic and EVA
Wooden
Cellulose
Cellulose

Others

Thread
Needle
Adhesive
Pattern paper
Elastic

Materials:

Nylon (60/3)
Metallic (134)
Neoprene
Paper
Synthetic

chapter-4

4.1 THE FOLLOWING PHYSICAL TESTS ARE CARRIED OUT

- **Tensile Strength & Elongation at break (slp-6, iup/6)**

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 is

calculated using following formula.

$$\text{Tensile Strength} = \frac{\text{Breaking load}}{\text{Thickness (cm)} \times \text{width (cm)}}$$

Results of Tensile Strength and % of Elongation:

| Sample No | Results for tensile strength and elongation at break | | | |
|-----------|------------------------------------------------------|--------------|------------------------------|--------------|
| | Perpendicular | | parallel | |
| | Tensile Strength Kg/sq.cm | Elongation % | Tensile strength Kg/sq.cm | Elongation % |
| 1 | 200 | 58 | 177 | 67 |

So tensile Strength and % of Elongation of sample is not good. The Standard value of Tensile strength and % of Elongation of shoe upper leather is 200 kg/sq cm (minimum) and 80 (minimum).

- **Stitch tear strength test (slp-7; iup-8):**

The double hole stitch tearing can be defined as the load (kg.) required to tear the sample of leather between two holes of 2 mm. Diameter each and whose center are 6 mm. Apart, expressed on its unit thickness (cm).

$$\text{Stitch tear strength Kg/cm} = \frac{\text{Tearing load (kg)}}{\text{Thickness (cm)}}$$

Results of Stitch Tear strength:

| Sample No. | Results of Stitch | |
|------------|-----------------------|------------------|
| | Perpendicular (kg/cm) | Parallel (kg/cm) |
| 1 | 85 | 80 |

So stitch tear strength of this leather is good as the standard value is minimum 80 kg/cm

- **Tongue tearing strength test (lp-9 / is: 5914-1970; pm 30 / SATRA):**

The load in Kg required to tear the leather beyond the cut made perpendicular to its surface, expressed per unit thickness (cm) of the test specimen is the tongue tear strength. Tongue tear strength of the specimen is calculated using following formula

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

Result of Tongue Tear strength:

| Sample No | Tongue tear strength, Kg/cm thickness |
|-----------|---------------------------------------|
| 1 | 32 |

The tongue tear strength of this leather is good as the minimum value is 30 kg/cm.

- **Vamp Flexing test**

Flexing endurance test is nothing but simple folding of leather specimen several times with the grain side out with the help of machine.

Results of Vamp Flexing:

| Sample | Mandle scale Rating at 1000 | Mandle scale rating at 10,000 | Mandle scale rating at 50,000 | Mandle scale rating at 80,000 |
|--------|--------------------------------|-------------------------------------|----------------------------------------|----------------------------------------|
| 1 | 2 | 2 | 3 | 3 |

The rating is 3 in mandle scale so the leather is not good.

- **Name of the test:** Sole bonding test

Purpose:

To assess the bond strength of the sole components to each other and to the upper and sock.

Principle:

A rectangular test specimen of 10x1 cm mounted between two clamps on tensile test machine. The specimen is then subjected to load and the results is shown in dial.

No. of test piece:

| Name | No of pieces |
|-----------------------|--------------|
| 1. Sole with platform | 1 |
| 2. Sock with platform | 1 |

Test results:

| | | |
|--------------------|------------|------------------|
| Name | Load in kg | Observation |
| Sole with platform | 15 | Adhesion failure |
| Sock with platform | 8 | Material failure |

Analysis:

In first case the adhesion failure were occurred. The reason is appropriate primer were not used.

In the second case the material failure were occurred. The bond strength is good.

4.2 COSTING SHEET FOR SHOE (CEMENT CONSTRUCTION)

| STYLE NO. | LAST NO | MENS/LADIES/CHILDREN | | | |
|-----------------------|----------|----------------------|-------|------------|--------------|
| | SF 483 | MENS | | | |
| TYPE OF SHOE | CUSTOMER | COSTING SIZE | | | |
| MEN'S OXFORD | | 7 | | | |
| PRICE VALIDITY | FROM | | TO | | |
| CURRENCY RATE | | | | | |
| SHOE COMPONENTS | AMOUNT | UNIT | PRICE | UNIT | COST(R)/P RS |
| Upper material | 2.25 | Sq.ft | 110 | Sq.ft | 247.5 |
| Lining material | .56 | Sq.ft | 65 | Sq.ft | 31.36 |
| Socks | .39 | Sq.ft | 65 | Sq.ft | 25.35 |
| Interlining textile | | | | | |
| Needles(34LR&134 PCL) | 2/50 | Pcs | 130 | 10 pcs/Pkt | .52 |
| Thread(60/3) | 12.14 | meter | 90 | Cone 1000m | 1.09 |
| Thread(40/3) | 12.14 | meter | 90 | Cone | .72 |

| | | | | | |
|-----------------------------------------------------------|------------------------------------------------------------|-------|--------|---------------|--------|
| | | | | 1500m | |
| Thread | | | | | 1.81 |
| Tapes(200mm wide) | | | | | |
| | | | | | |
| heel grip | | | | | |
| Laces | | | | | |
| Elastic | | meter | 30 | meter | 3 |
| Eyelet (Brass Blend) | | | | | |
| Metallic Trims | | | | | |
| Consumables, thermo adhesive for folding, rubber sole etc | | | | | .28 |
| Counter | 1 | Pair | 170.00 | 55pair /sheet | 3.09 |
| Toe puff | 1 | Pair | 170.00 | 65pair /sheet | 2.62 |
| Unit sole of PVC leather/TPR/TP/ Rubber | 1 pair | | | | 50 |
| Insole | | | | | 12 |
| Shoe consumables Tacks/glue/finish | Tacks-0.17 latex 0.68 PU ade-5.68 neoprene finish- 2.50 | | | | 10.65 |
| Shoe box | | | | | 7.00 |
| Shoe carton | | | | | 25.8 |
| Strap/labels | | | | | 0.30 |
| Total material cost | | | | | 421.28 |
| Provision for rejection | | | | | |
| Direct labor | | | | | 22.00 |
| Overheads | | | | | 17.00 |
| Total cost | | | | | 460.28 |
| | | | | | |
| CIF price | | | | | |
| Add 8% duty draw back | | | | | |
| Margin | | | | | |

costing :

| Department | Labour (A) | Materials (taka) |
|---------------------|-------------------|-------------------------|
| Cutting | | |
| Closing | | |
| Btm stock | | |
| Sewing | | |
| Shoe room | | |
| Misc | | |
| Reserve (3%) | | |
| | | |

Prime cost

Production overhead (100% of a)

General overhead:

Administration

Samples.....

Reject and repair.....

Distribution.....

Total ex factory

Discount given (5%)

margin:

Standard selling price per pair

chapter-5

5.1 Summary:

The cemented construction is now very widely used in footwear manufacture. The

outstanding advantages of the construction are:

- ❖ Lightness in weight and greater flexibility due mainly to the absence of tacks requiring a heavy insole thus adding to the weight of the shoe.
- ❖ Economy due to the elimination of highly skilled operations and the machinery involved. This is mainly due to the advent of pre-finishing of soles.
- ❖ A reduction of operations speeds up the work flow and makes more economical use of the last plant.

The main disadvantages:

- ❖ Cemented soles are difficult to repair because the shoe can easily lose shape when the sole is removed, making it difficult to prepare a good surface to attach a new sole. The light substances insole makes it impossible to stitch the sole to the upper.
- ❖ The light substance insole can cause difficulties in lasting, as it may easily roll back from the feather edge of the last. This causes a poorly defined feather edge in the finished shoe and may breakdown in wear.

The widespread use of the wide spread use of the cemented construction has, obviously, depended on the development of adhesives which are suitable for the variety of materials involved. Thus, it is essential that before any adhesive system is adopted, sufficient laboratory testing is carried out to prove that the proposed system is a suitable one.

Figure: 5.2

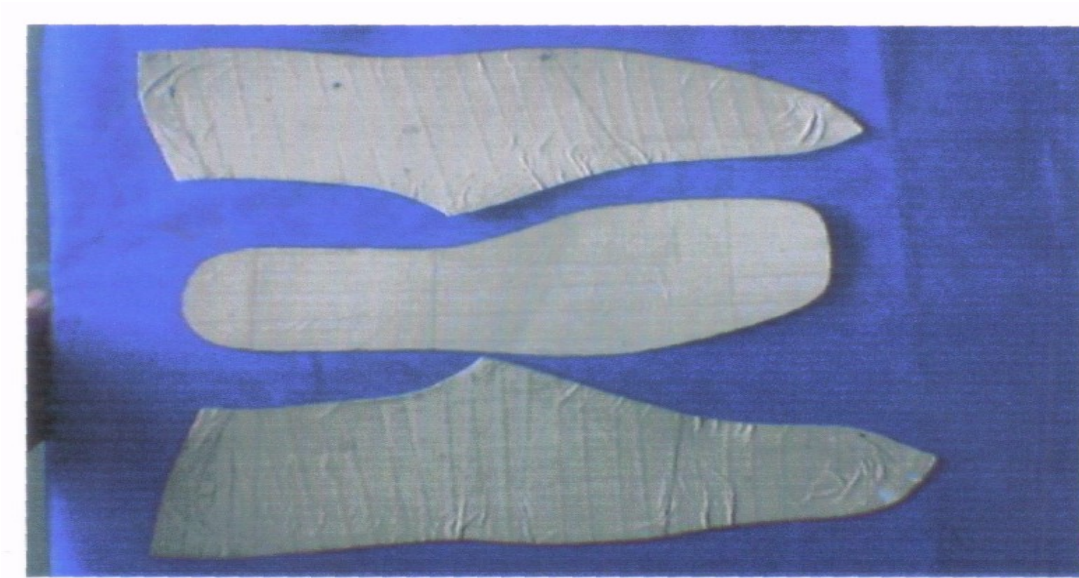


FIG: MASKING INSIDE, OUTSIDE AND BOTTOM PATTERN

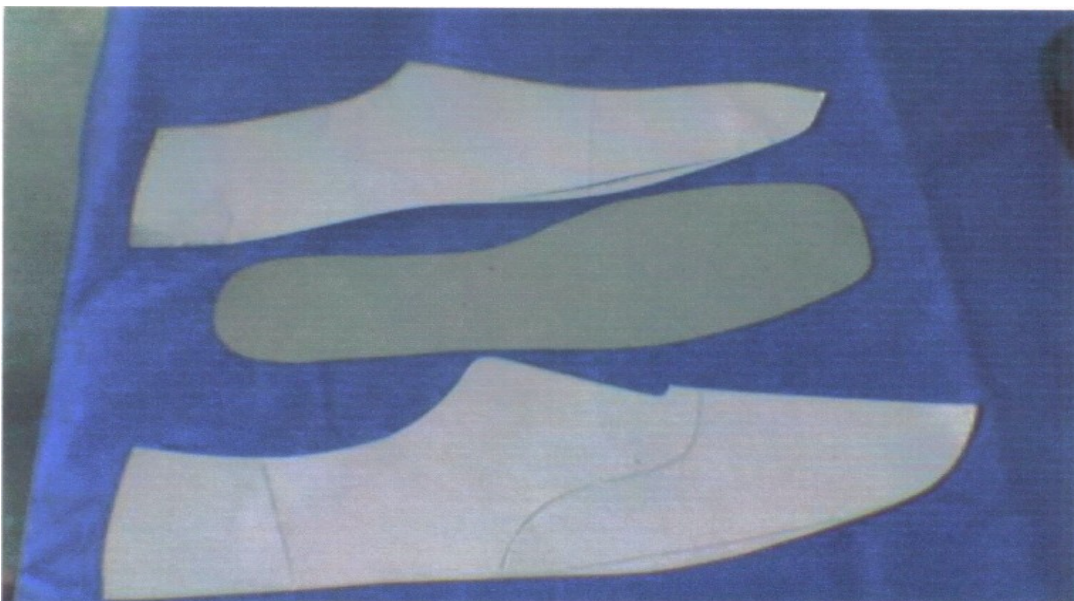


FIG: LINING STANDARD, MEAN FORME AND INSOLE PATTERN

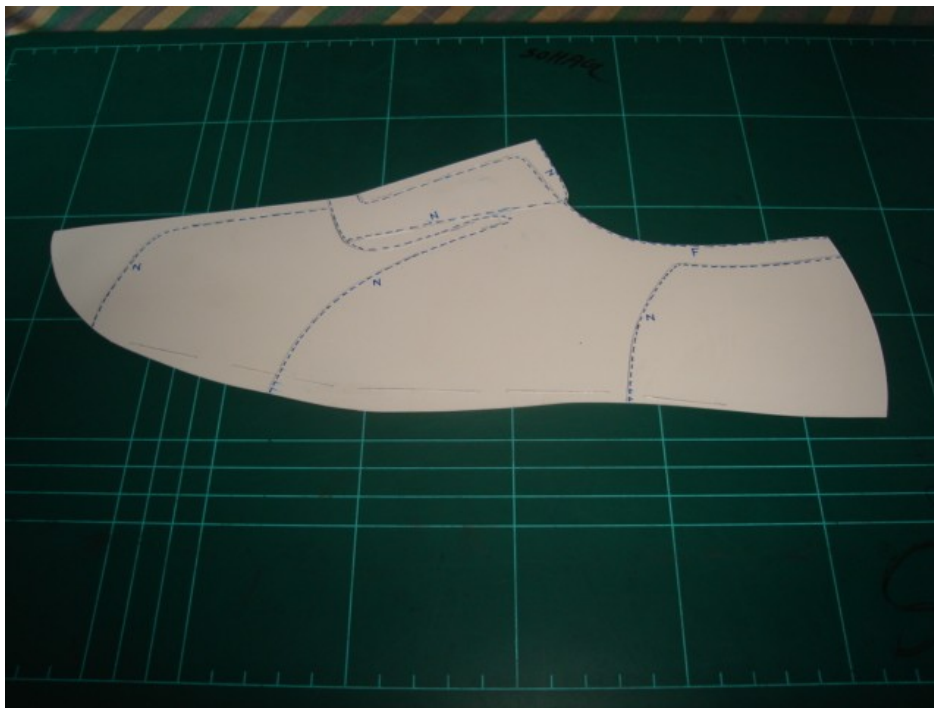


FIG : STANDARD FORME



FIG: CLOSING UPPER



FIG: UPPER PATTERNS

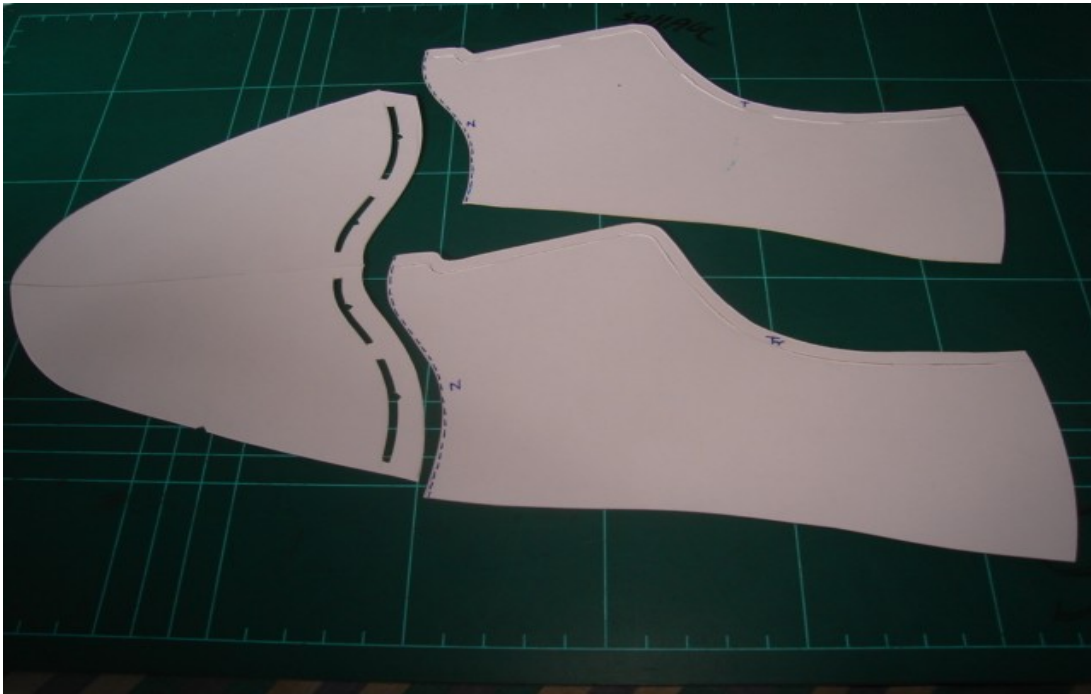


FIG: LINING PATTERNS

chapter-6

Footwear industry is a low capital intensive and less power consuming industry, which is capable of absorbing manpower even on becoming fully machine based. To improve the quality of export footwear we have to produce attractive design and well construction. If we produce better quality product, we will be able to earn foreign exchange and thus we will be able to remove employment problem by engaging many people to this type of industry. So, skilled manpower should be produced by training or other programme. It is estimated that with proper training and logistic management, quality must improve. If a programme is followed as at least one trainee per factory can be trained, he or she can train 50 to 100 others in his factory in the shortest possible time, thereby improve quality of footwear. I hope that this industry will receive the attention it deserves from the government and from the private sector so as to enable it to realize its true potential.

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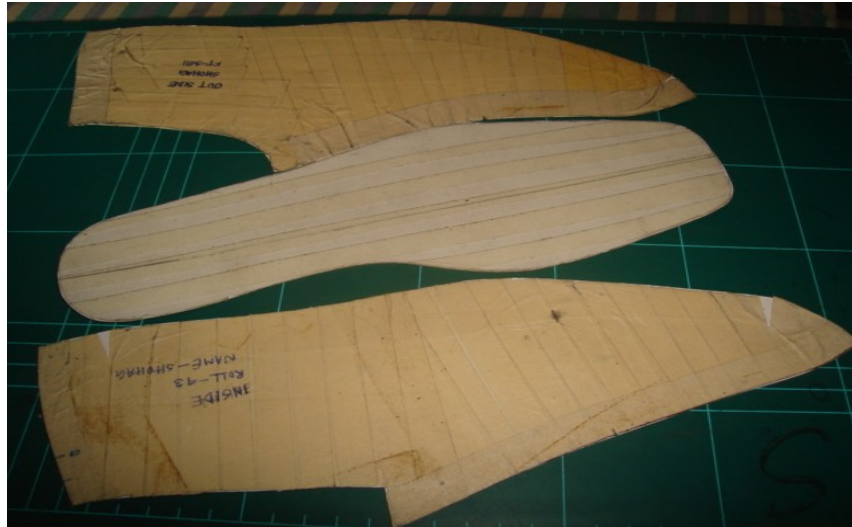


FIG: OUTSIDE, INSIDE AND BOTTOM PATTERN.

4.2 Stitch tear strength test (slp-7; iup-8):

The double hole stitch tearing can be defined as the load (kg.) required to tear the sample of leather between two holes of 2 mm. Diameter each and whose center are 6 mm. Apart, expressed on its unit thickness (cm).

$$\text{Stitch tear strength Kg/cm} = \frac{\text{Tearing load (kg)}}{\text{Thickness (cm)}}$$

Results of Stitch Tear strength:

| Sample No. | Results of Stitch | |
|------------|-----------------------|------------------|
| | Perpendicular (kg/cm) | Parallel (kg/cm) |
| 1 | 85 | 80 |

So stitch tear strength of this leather is good as the standard value is minimum 80 kg/cm

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The load in Kg required to tear the leather beyond the cut made perpendicular to its surface, expressed per unit thickness (cm) of the test specimen is the tongue tear strength. Tongue tear strength of the specimen is calculated using following formula

$$\text{Tearing load (kg)}$$

Tongue tearing strength, Kg/cm = $\frac{\text{---}}{\text{Leather thickness (cm)}}$

Result of Tongue Tear strength:

| Sample No | Tongue tear strength, Kg/cm thickness |
|-----------|---------------------------------------|
| 1 | 32 |

The tongue tear strength of this leather is good as the minimum value is 30 kg/cm.

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Flexing endurance test is nothing but simple folding of leather specimen several times with the grain side out with the help of machine.

Results of Vamp Flexing:

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|--------|--------------------------------|-------------------------------------|----------------------------------------|----------------------------------------|
| 1 | 2 | 2 | 3 | 3 |

The rating is 3 in mandle scale so the leather is not good.

