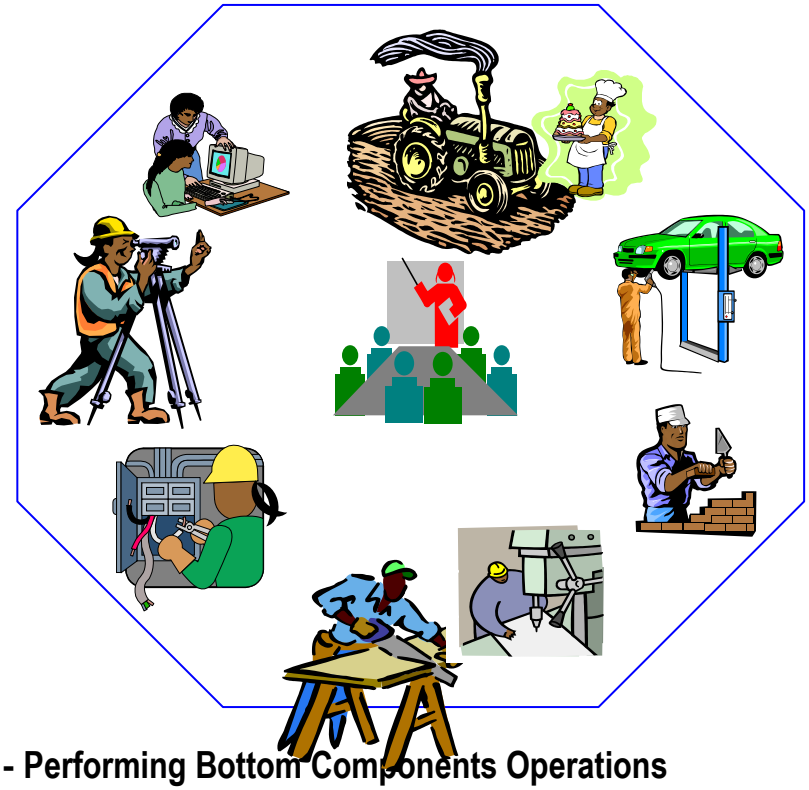
Footwear Production Operations Level II

Based on Nov, 2019, V5 OS and Feb, 2020 V1 Curriculum



Module Title:- Performing Bottom Components Operations

LG Code: IND BFP2 MO8 LO(1-3) LG(36-38)

TTLM Code:IND BFP2 TTLM 1220v1

December 2020

Contents

LG #36 LO1. . Prepare tools, materials, equipment and machines

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- **Identifying and selecting materials used as bottom component**
- **Identifying and making tools and machines ready for operation**
- **Performing handling and care requirements for materials.**
- **Identifying common problems and faults of materials.**

- **Identifying suitable personal protective equipment**
- **Identifying safety of operator and work place in component section**

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and selecting materials used as bottom component
- Identify and making tools and machines ready for operation
- Perform handling and care requirements for materials.
- Identify common problems and faults of materials.
- Identify suitable personal protective equipment
- Identify safety of operator and work place in component section

Learning Activities

1) Read the specific objectives of this Learning Guide.
2) Read the information written in the “Information Sheets 1”.
3) Accomplish the “Self-check 1” in page 8. Request the key answer / key to correction from your teacher or you can request your teacher to check it for you.
4) If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #2.
5) Submit your accomplished Self-check. This will form part of your training portfolio.
6) Read the information written in the “Information Sheet 2”.
7) Accomplish the “Self-check 2” in page 25. Again you can request the key answer / key to correction from your teacher or you can request your teacher to check it for you.

8) If you earned a satisfactory evaluation proceed to “Information Sheet 3”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #6.

9) Submit your accomplished Self-check. This will form part of your training portfolio.

10) Read the information written in the “Information Sheet 3”.

11) Accomplish the “Self-check 3” in page 49. Again you can request the key answer / key to correction from your teacher or you can request your teacher to check it for you.

12) If you earned a satisfactory evaluation proceed to “Information Sheet 4”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #10.

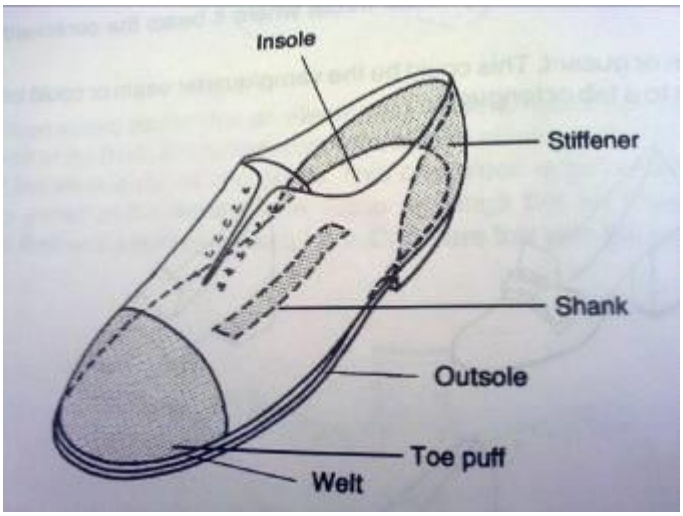
13) Submit your accomplished Self-check. This will form part of your training portfolio.

14) Read the information written in the “Information Sheet 4”.

15) Accomplish the “Self-check 4” in page 51. Again you can request the key answer / key to correction from your teacher or you can request your teacher to check it for you.

16) Submit your accomplished Self-check. This will form part of your training portfolio

Information Sheet 1- Identifying and selecting materials used as bottom component



The principal part of the shoe

The anatomy of a shoe can be divided broadly in an upper part and bottom part. Section of the upper part includes vamp, quarter, toecap, topline etc. the section of the lower shoe (bottom part) consist of an insole, outsole, shank and heel. Various areas of the shoe have different names.

Bottom part mainly consists of sole, insole and heel. Some of the main bottom parts are explained below:-

1.1 Bottoms Components

This is a term which refers to the whole of the bottom of shoe as opposed to the upper. It generally includes some of the following, depending on type of construction.

a. Insole
b. Sole.
c. Welt.
d. Bottom fillings.
e. Heel, heel lifts and top piece.

Components: This is collective term which is used to describe items which is in

Corporate in shoe and includes the following.

a. Toe puff.
b. Stiffener.
c. Shank.
d. Socks

Insole: A layer of material shaped to the bottom of the last and sandwiched between the outsole (or midsole) and the sole of the foot inside the shoe. The insole covers the join between the upper and the sole in most methods of construction and provides attachment for the upper, welting. This provides a platform upon which the foot can operate and separates the upper from the lower. This is the inner sole of the shoe which is next to the foot under the shoe

sock. Athletic shoe wear will often have a sockliner, a piece of material placed over the top of the insole board (glued in position or removable).

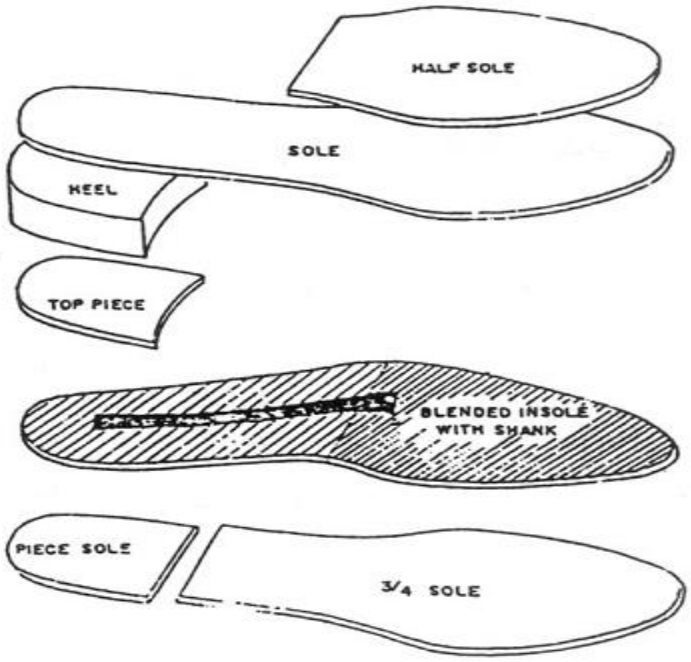
Sole: The term sole derives from 'solea' a latin word meaning soil or ground. This is the outer most sole of the shoe, which is directly exposed to abrasion and wear. Traditionally made from a variety of materials, i.e. leather, pure rubber, resin rubber compound, plastic etc. the outsole is constructed in different thickness and degrees of flexibility. The layer of material which covers the bottom of the shoe and is the walking surface of that shoe.

Welt: Welt is strip of material that joins the upper to the sole. Most shoes will be bonded by Goodyear welted construction. Some shoes use an imitation welt stitched around the top flat edge of the sole for decorative purpose, but it is not a functional part of the shoe.

Bottom Filling: This is used to fill the cavity between the insole and the sole or middle sole. Bottom filling is usually made of a granulated cork mixture, leather or felt cut to shape. It is essential, as it goes in the forepart of the shoe, that whatever is used is flexible.

Filler means the materials which fills the cavity or gap. Bottom filler is a kind of material which fills the cavity formed during the lasting. Almost all types of footwear needed bottom filler. It may be in the forepart, heel portion or whole of the bottoms area.

Heel: The heel is the raised component under the rear of the shoe. Heel consist of a variety of shapes, heights and materials and are made of a series of raised platforms. The part of the heel next to sole is usually shaped to fit the heel, this is called the heel seat or heel base. The heel breast describes front face of the heel. The ground contact section is called the top piece. Heels raise the rear of the shoe above the ground. A shoe without a heel or midsole wedge may be completely flat. When the heel section sits lower than the forefoot the style is called a 'negative heel'. The under part of the shoe which supports the heel of the foot, and may be stuck or nailed to the shoe bottom. Can be made of leather, wood, plastic, rubber, leather board, etc.



Heel Base: That part of the heel next to the sole, usually concave to fit the heel seat.

Heel Breast: The forward face of the heel, often concave towards the shank. **Heel Seat:** The part of the sole to which the heel is attached, often beveled to form a rounded top which fits into the concave heel base.

Heel lift: layers of material such as leather or leather board which are built up together and shaped to form built heels.

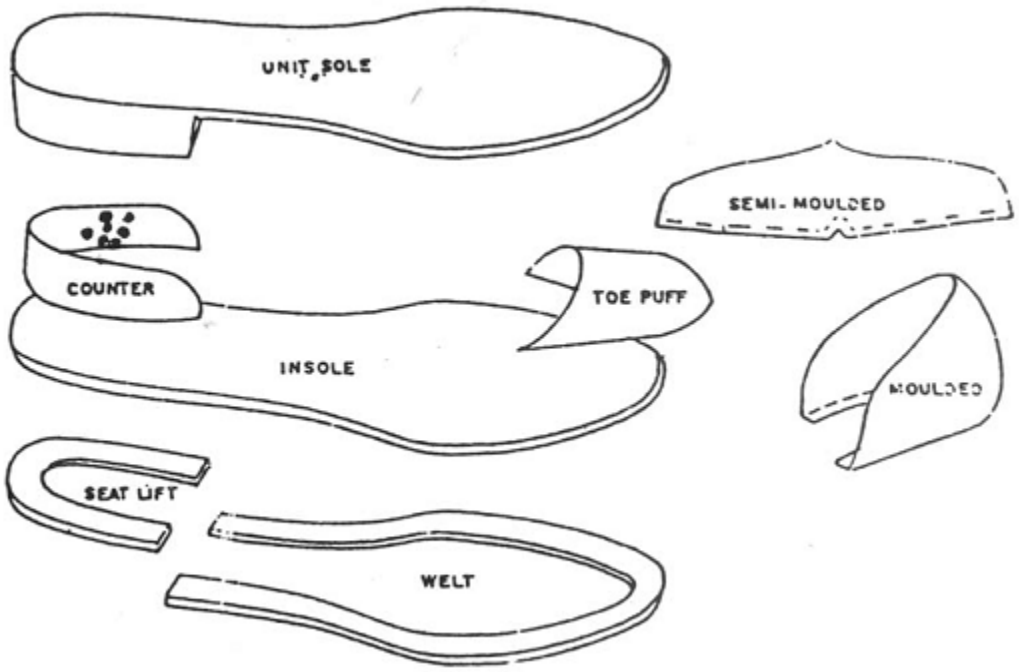
Top piece: The top surface or walking surface heel is called as top piece.

Toe Puff: A stiffening which is inserted between the upper and lining at the toe of the shoe. The purpose of this is to reproduce the shape of the toe of the last and to retain that shape throughout the life of the shoe.

Stiffener: A stiff material which may be molded to the shape of the last back part or, alternatively, inserted flat and molded during subsequent processes. It is normally inserted between the lining and upper to support the back of the shoe and to grip the foot.

Shank: The shank bridges between the heel breast and the ball tread. The shankpiece or shank spring can be made from wood, metal, plastic and consists of apiece approximately 10 cm long and 1.5 cm wide. The shankpiece reinforces the waist of the shoe and prevents it from collapsing or distorting in wear. The contour of the shank is determined by heel height. Shoes with low heels or stiff soles do not require a shank because the torque between the rear and forefoot does not twist the shoe.

Socks: A piece of material shaped to cover the whole or part of the insole. It is inserted into the completed shoe and usually bears the maker's name and the shoe brand name.



Self-Check 1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 11)**

1. Which material is join the upper and sole (Mark 1)

(a) Welt (b) Toe puff (c) Stiffener (d) Heel

2. Which material is used for sole manufacturing (Mark 1)

(a) V.T. Leather (b) Chrome leather (c) both of them (d) none

3. Heel lift is a layer of (Mark 1)

(a) sole (b) Material (c) Insole (d) none

4. Bottom filler is used (Mark 1)

(a) To fill the cavity (b) To improve sole appearance

(c) To improve sole bonding (d) All of them

5. Insole is match with (Mark 1)

(a) To match foot shape (b) To match last bottom shape

(c) To match upper thickness (d) To match sole profile

6. Which component is come under bottom component (Mark 1)

(a) Vamp (b) Quarter (c) Lining (d) Socks

7. Socks are use between sole and insole? True/False (Mark 1)

8. Toe puff is use in back part of shoe? True/False (Mark 1)

9. Shank is use for making sole? True/False (Mark 1)

10. Insole of shoe which is next to the foot under the shoe sock? True/False (Mark 1)

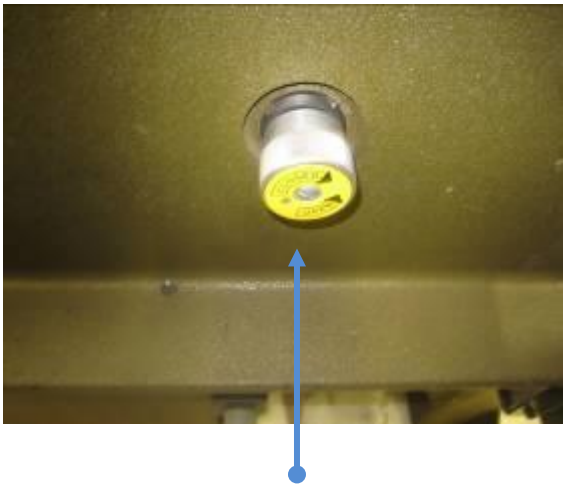
11. Heel breast is forward face of the heel? True/False (Mark 1)

Information Sheet 2- Identifying and making tools and machines ready for operation

1.3 MACHINERY AND EQUIPMENT FOR UNIT INSOLE MAKING

1.3.1. Travelling Head Cutting Machine: Machine is used for cutting insole & shank board.

Front side **Back side**



Hydraulic Pressure Adjustment

Travelling Cutting Head

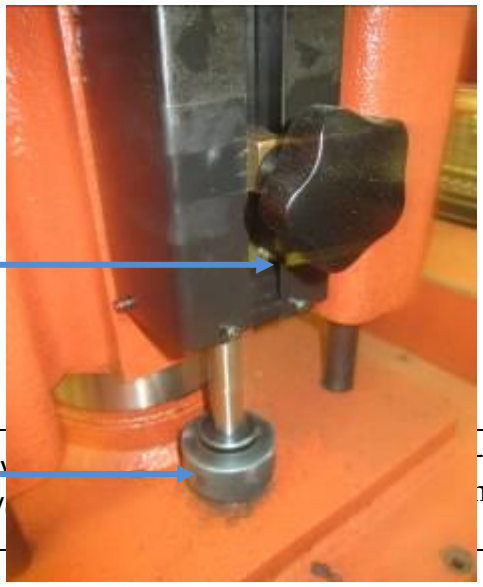
1. **Normal mode**
2. **Adjustment mode**

1

2

3

1. **The Cutting Beam Movement Speed Control**
2. **Feed Roller Controller**
3. **Power Switch**



1

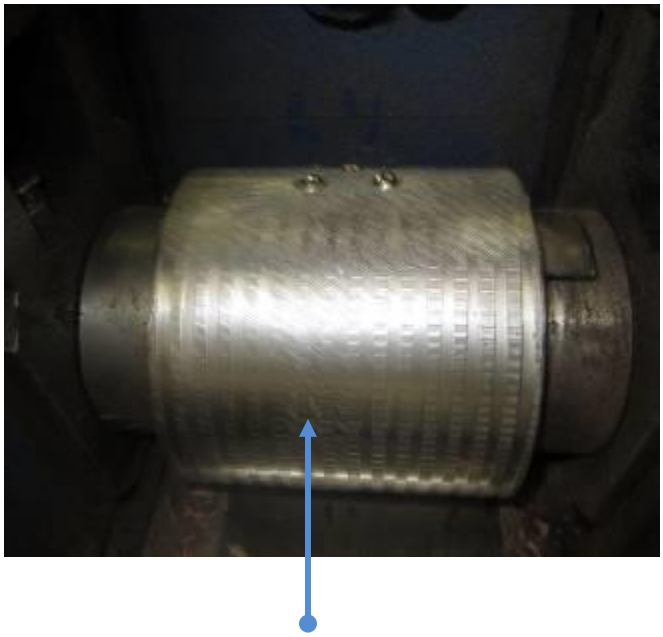
2

1. **Height Adjustment**

2. **Die Cutting Pressure**

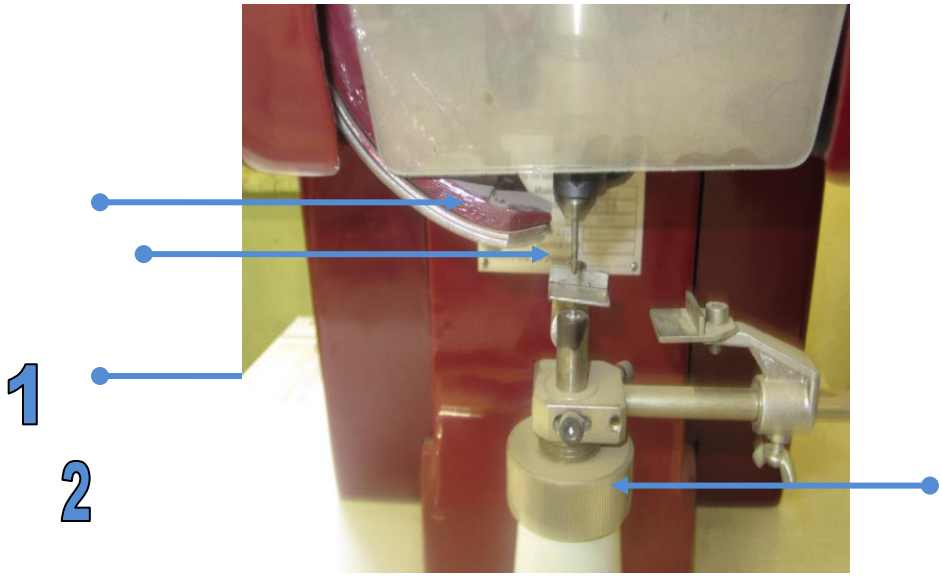
1.3.2. Matrix Skiving Machine: Machine is used for matrix skiving on the forepart of the shank board in making insole.

Emergency Button



Matrix Skiving Roller

1.3.3. Steel Shank Riveting Machine: To put the rivet in steel shank for attaching with Shank board.

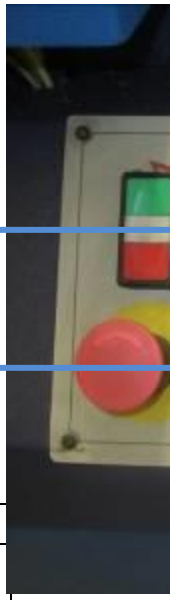

1
2

3

1. **Eyelet Feeding**
2. **Hammering Rod**
3. **Height Adjustment**

1.3.4. Shank Grooving Machine: Machine is used for reduce the material for shank board according to measurement of shank.

1



3

2

1. **Automatic**
2. **Manual**
3. **PLC(Program Logic Control)**

2

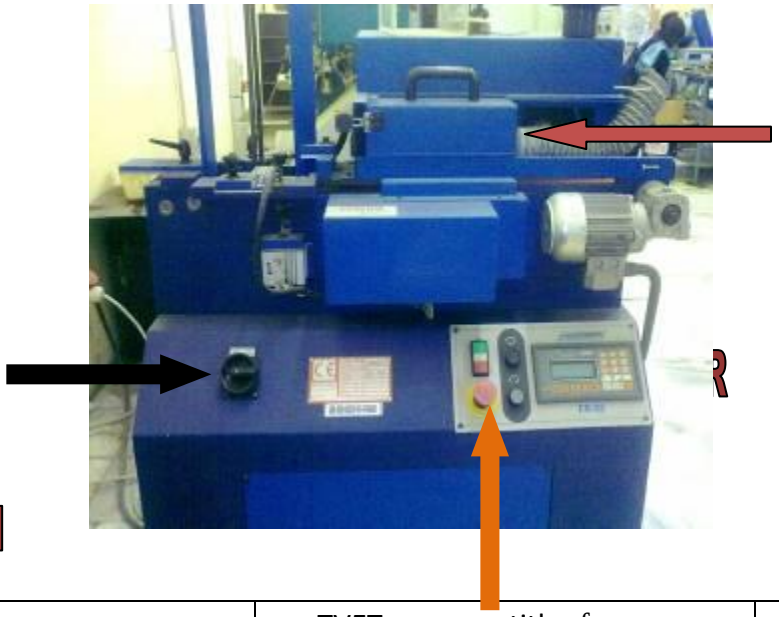
1

3

4

1. **For Cutter Switch On**
2. **Shank Length adjustment for Shank Cut**
3. **Press 0 Button For Change Value**
4. **Then Press Enter For Save**

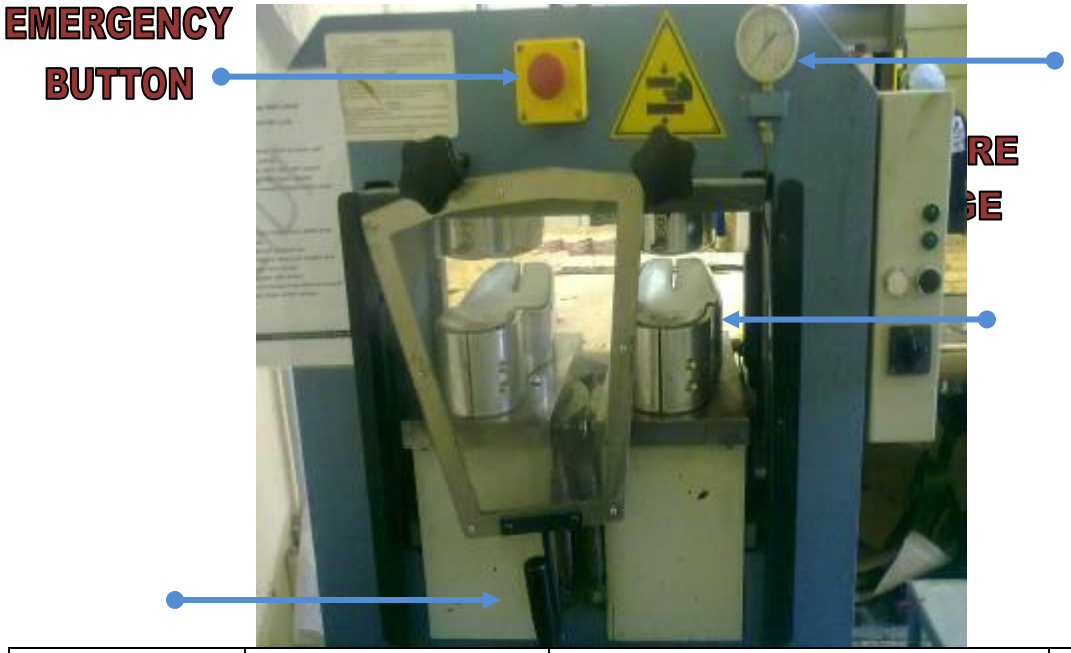
Shank Heel Length Gap Adjustment from Back Side



EMERGENCY BUTTON

1.3.5. Insole Molding Machine: To give the pressure on insole according the last bottom profile.

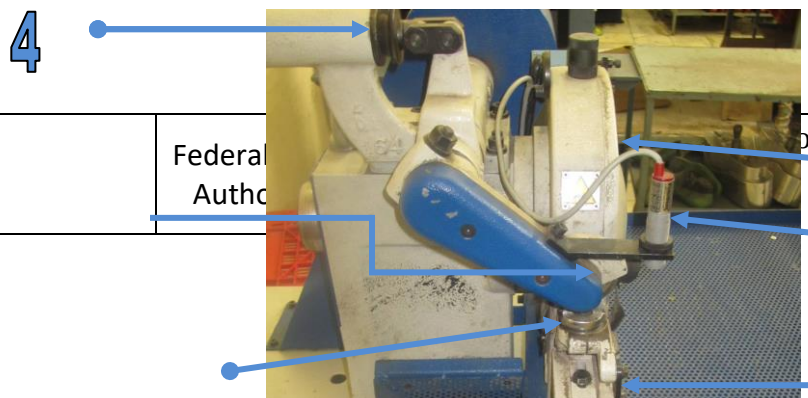
Hydraulic Pressure Regulator

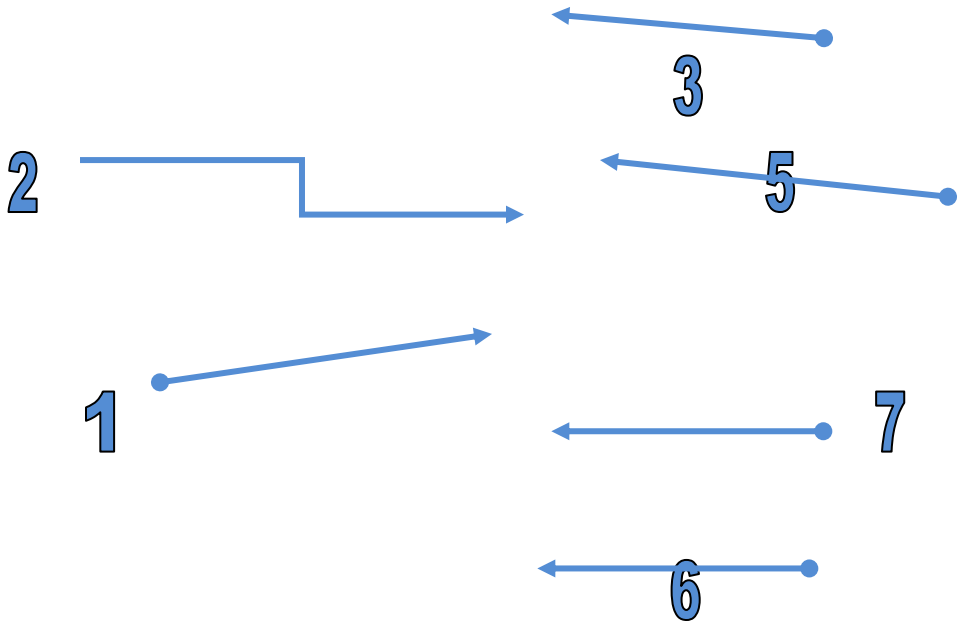


HANDEL

1.3.6. Insole Moulds:

1.3.7. Beveling m/c: This m/c is used for cutting the back part of the insole according to the bevel angle of the last.





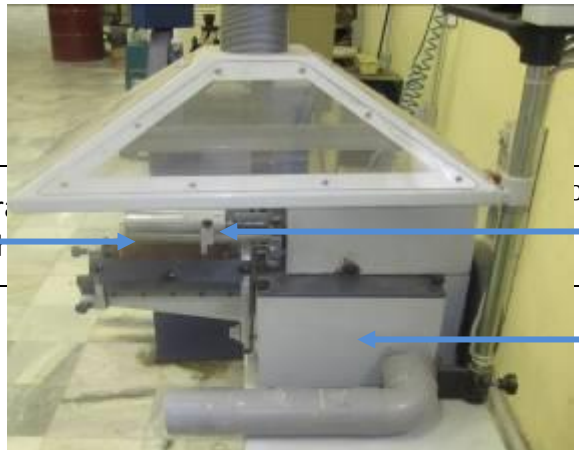
1. **Guide Roller**
2. **Feed Roller**
3. **Edge Trimming Cutter**
4. **Pressure Foot Adjustment for Feed Roller**
5. **Photo Electric Sensor for Insole Turning Speed Controlling**
6. **Guide Roller Front & Back Movement**
7. **Angle Adjustment for Guide Roller**

1. **Photo sensor With deduction speed controller**
2. **Photo sensor Without deduction Speed controlling**

1.3.8. Cutting dies:

1.3.9. Cementing (Plain) : This m/c is used for only Insole board.

Cementing (flexible) : This m/c is used for only shank board



1 2

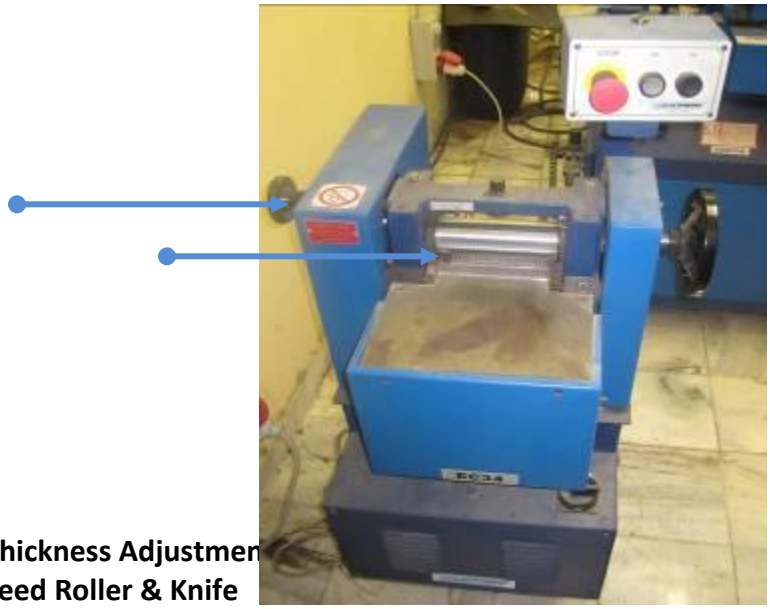
3

1. **Glue Apply Roller**
2. **Allowance Guide**
3. **Glue Tank**

MACHINERY AND EQUIPMENT REQUIRED FOR UNIT SOLE MAKING

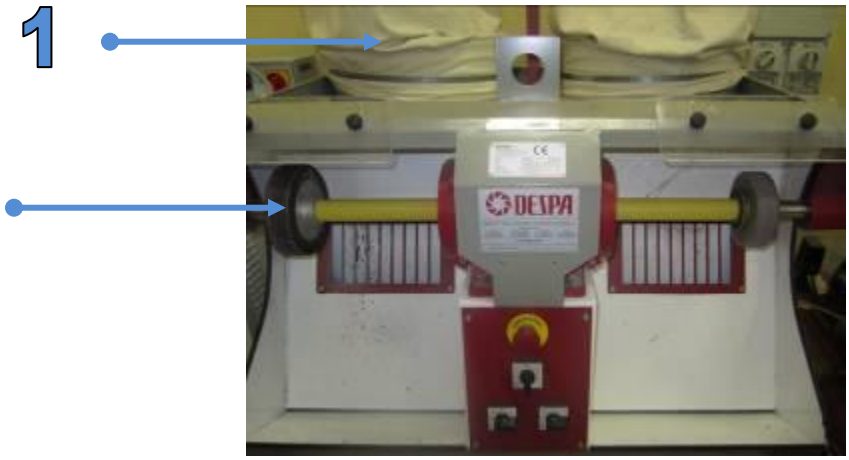
1.3.1. Travelling head cutting press: Machine is used for cutting sole & heel.

1.3.2. Splitting machine: This machine is use for split the leather for uniform thickness as per the requirement of substance



1. **Thickness Adjustmen**
2. **Feed Roller & Knife**

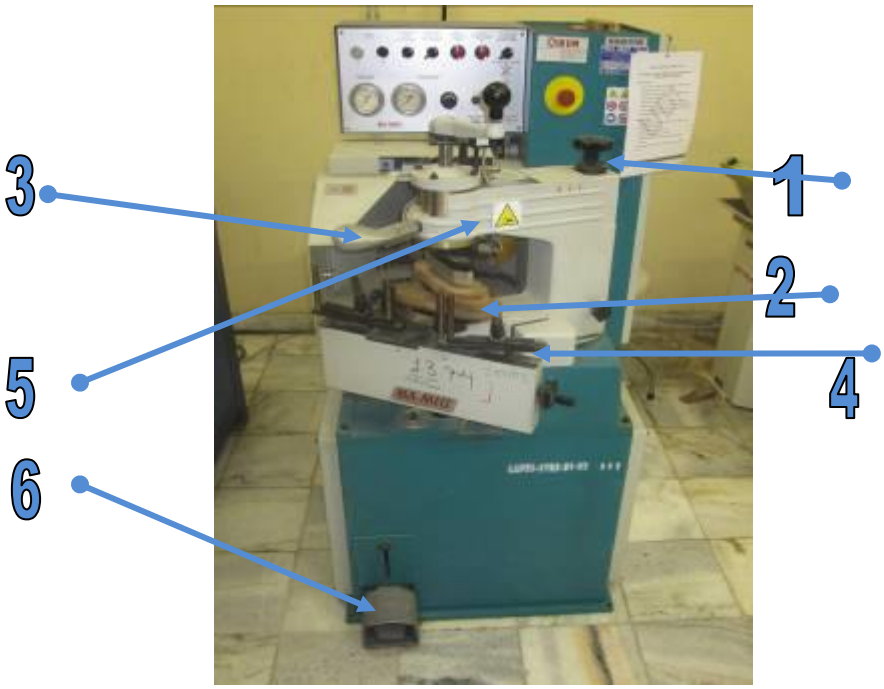
1.3.3. Roughing m/c: This is the process to raise the fiber for deeper penetration of adhesive during sole pressing.



1. **Dust collector**

2. **Emery wheel**

1.3.4. Sole Edge trimming machine: This outsole trimming machine adapts to make the edge of outsole round shape, flat & straight arc according to desired craftwork of outside appearance of high quality leather shoes, which make the edge of leather shoes more beautiful and elegant.



1. **Height adjustment**
2. **Pattern holder**
3. **Holder up & down switch**
4. **Pattern holding clamp**
5. **Arm**
6. **Foot paddle**
7. **Cutter**

1. **Speed Controller**
2. **Pressure Regulator**
3. **Pneumatic Pressure Gauge**

1.3.5. Heel cupping machine: Heel cupping machine give special shape to heel so that seat of lasted upper can sit properly on the heel cup to avoid gaping on the edges.

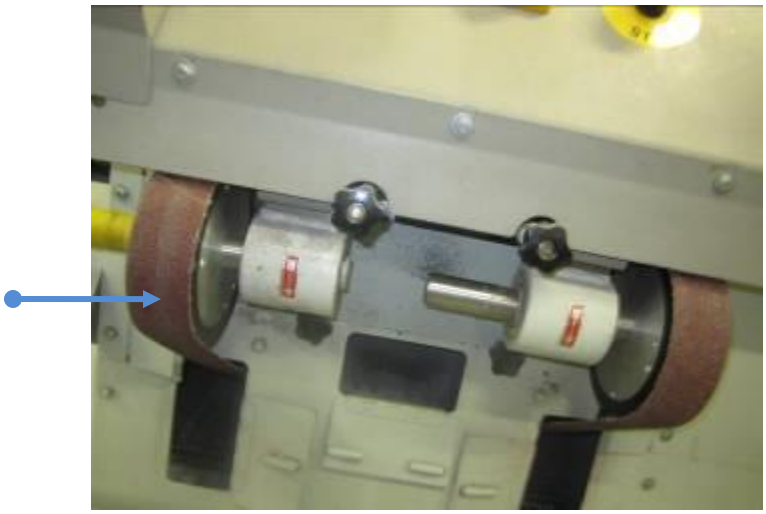
1.3.6. Sole grooving machine: This machine is self-possessed of powerful mechanism, cutting and decorating mechanism. The lift of worktable is controlled by pneumatic device, electrical equipment system controlled by integrated loop circuit and replaceable accessories of different specification.

1.3.7. Track roughing machine: Track roughing machine remove the filters in certain width & depth of flash side of the sole. So that lasted upper can sit properly in to the track.

1.3.8. Sole edge coloring machine: Coloring or inking machine with chromed rollers for coloring men's and women's flat soles, heel covers, strips of leather or skins etc. with perfect results, using water, alcohol, or wax based inks. Dosing is very simple and coloring results are perfect. Stainless steel extractable ink tank making color change and cleaning rapid and easy.

1.3.9. Sole stamping machine: Stamping machine for marking size, brand name etc on the sole. Molding plate with designs makes the stick to leather surface firmly by heating, which will never become lighter.

1.3.10. Sole buffing machine: This machine gives finishing tech to the sole. Buffing on sole with fine emery paper 150-180.



Emery Pape

1.3.11. Sole polishing machine: Feature of this machine are mainly for after-processing's polishing (surface decoration, waxing, coloring, etc), Natural carnauva application on woolen brush & finishing the sole with the R.P.M. of 1600.

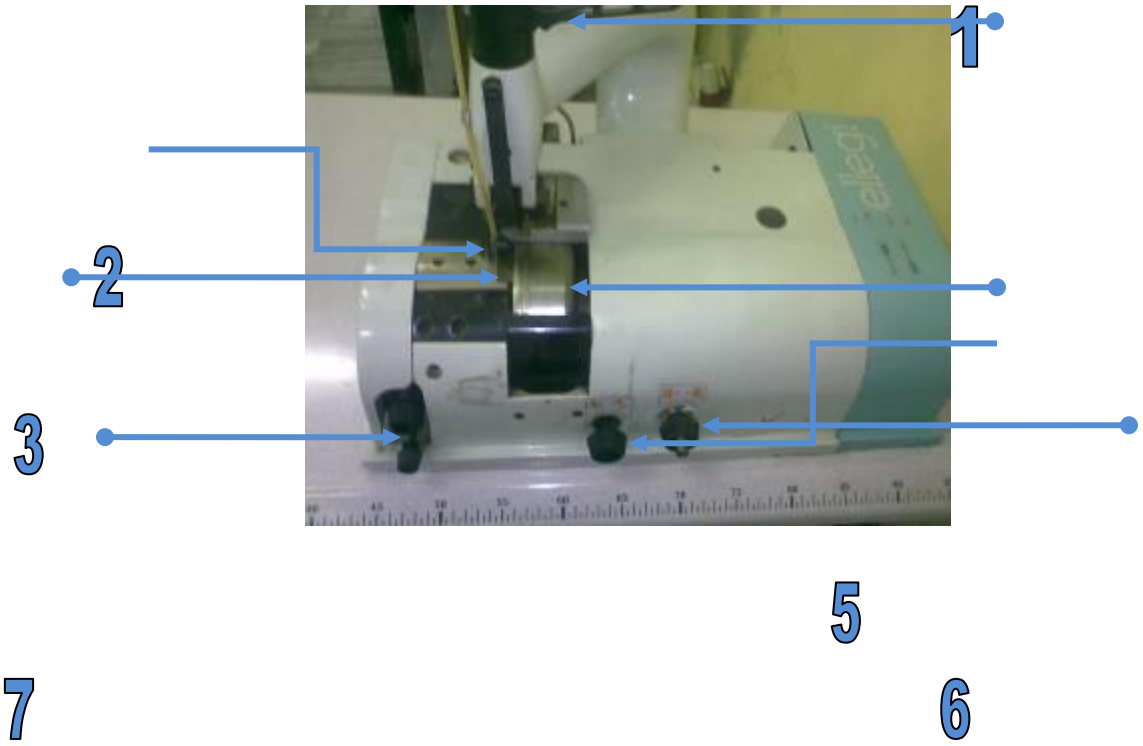
1.3.12. Heel trimming & shaping machine: This machine is used for remove the extra material from heel and gives proper shape.

1.3.13. Cutting dies:

MACHINE AND EQUIPMENT REQUIRED FOR TOE-PUFF AND COUNTER STIFFENERS

1.3.1. Travelling head cutting machine: This m/c is used for cutting toe-puff and stiffener sheet.

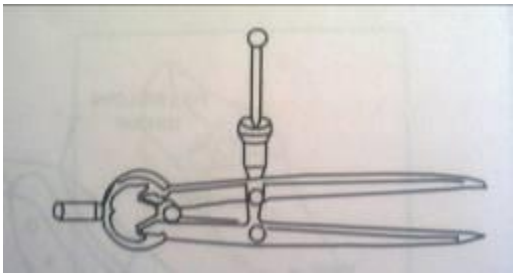
1.3.2. Heavy duty Skiving machine: skiving machine is use to reduce the thickness of toe-puff & stiffener from the edge.

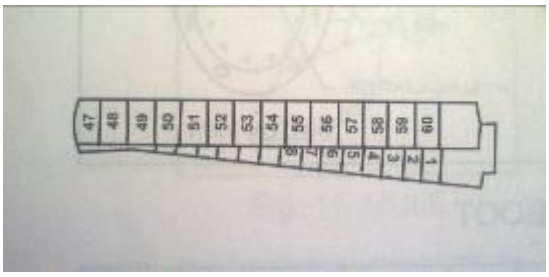


1. **Pressure Foot**
2. **Allowance Guide**
3. **Feed Roller**
4. **Bell Knife**
5. **Knife Grinding Adjustment**
6. **Knife Movement**
7. **Feed Roller Adjustment**

1.3.3. Cutting dies:

Equipment:



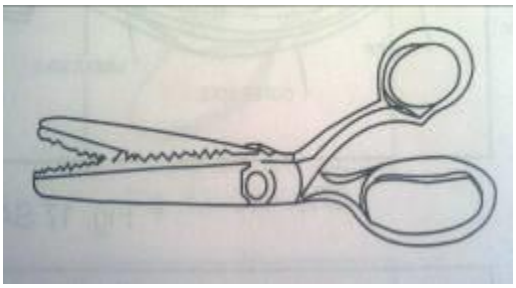


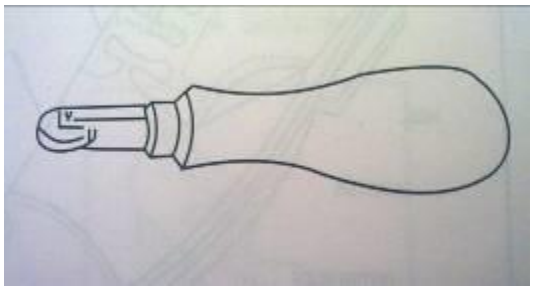
SPRING DIVIDERS:

Used for measuring various

MEASURING TAPE:

Used for measuring foot length, shoe



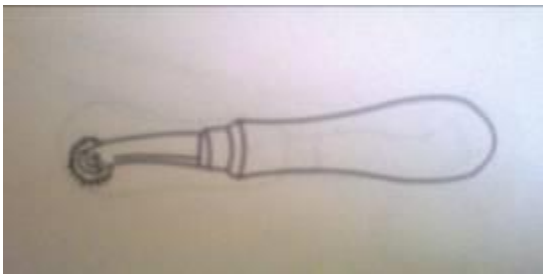


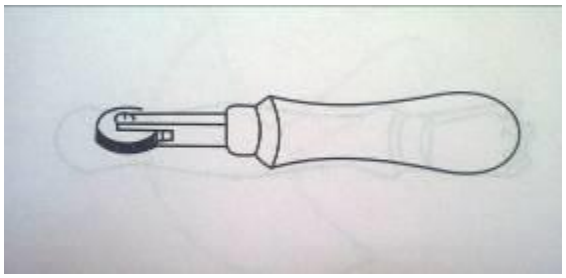
INDENTING SCISORS:

Used for giving a decorative edge treatment to sock, especially for

FUDGE WHEEL:

Tool to give decorative treatment to



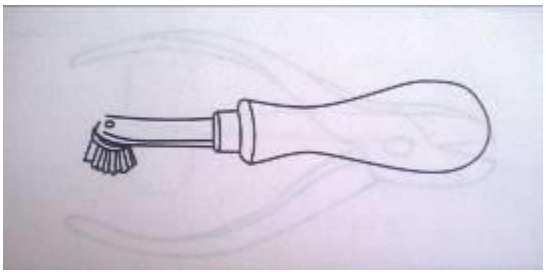


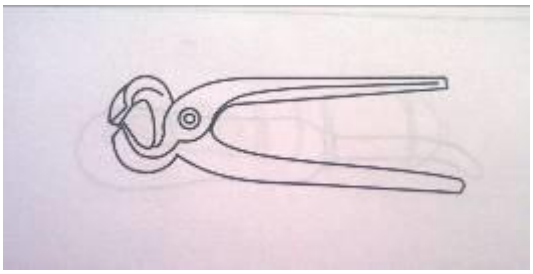
STITCH MARKER:

Used to make the decorative stitches for the guidance of the stitchers

SEAT WHEELING TOOL:

A tool to give a decorated serrated marking at the top of the heel.



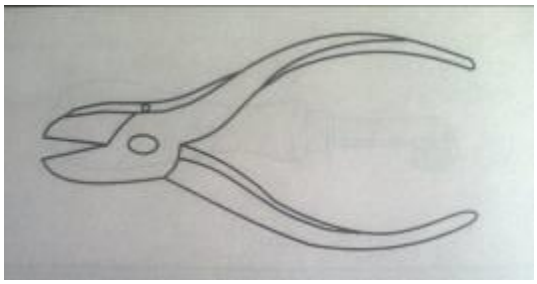


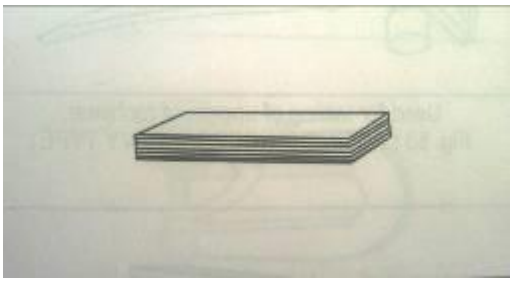
STITCH SEPARATING WHEEL:

Used on the welt of the sole stitching. The wheels can be changed to suit the size of stitches.

CUTTING NIPPERS:

Generally Used for cutting and extracting nail like heel nails



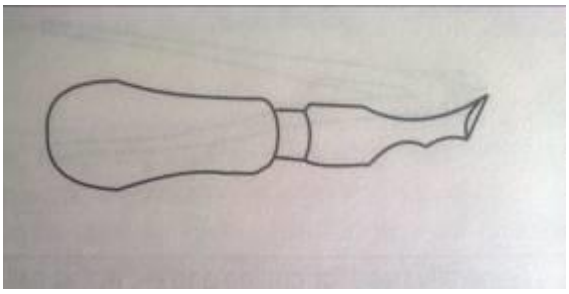


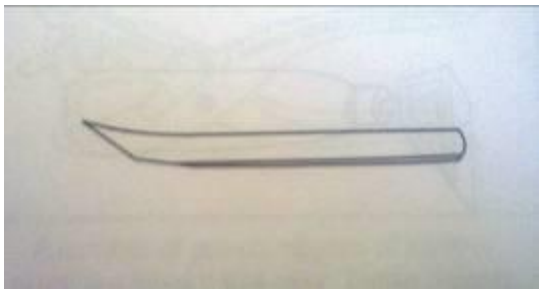
STITCH MARKER:

Used to make the decorative stitches for the guidance of the stitchers

SHARPEING STONE:

Used for sharpening various kinds of knives in the shoes manufacture.



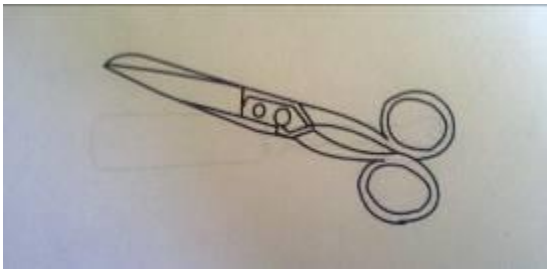


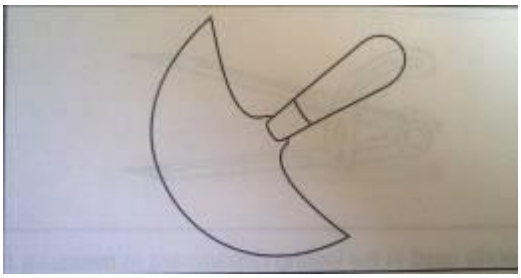
CHANNEL OPENER:

Open the channel has been cut, this tool is used for opening the channel properly to facilitate the stitching of

PARKING KNIFE:

Used at various stages in the shoe manufacture for cutting sole leather.



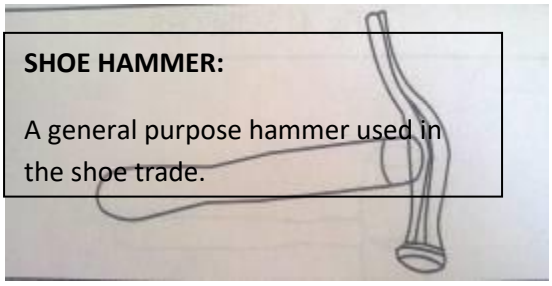


SCISSORS:

Used by the closing room workers for trimming thread ends, cutting slots and for other similar works.

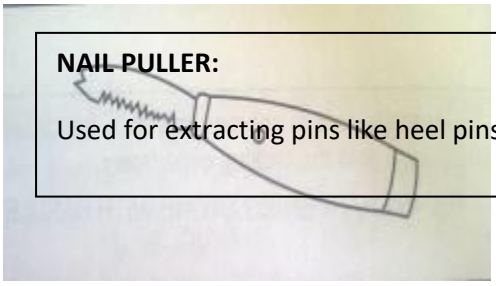
CUTTING KNIFE:

Generally used for cutting leather of heavy type.



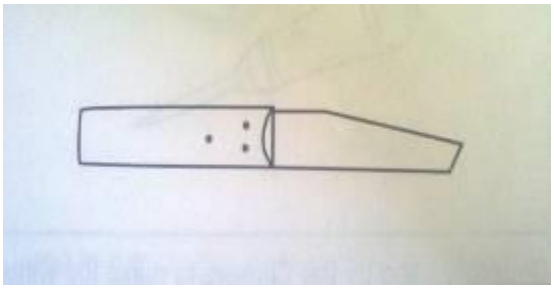
SHOE HAMMER:

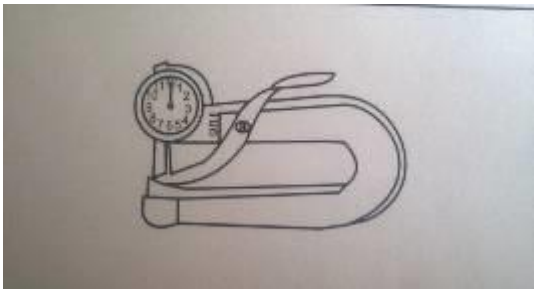
A general purpose hammer used in the shoe trade.



NAIL PULLER:

Used for extracting pins like heel pins.





SHOE KNIFE:

Used specially in ranging of sole leather.

LEATHER THICKNESS (MEASURING GAUGE):

Used for measuring thickness of

Self-Check 3	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. (Total marks 11)

1. Edge Bewailing is necessary for (mark 1)

(a) Lasting (b) Insole Making (c) Better Look (d) None

2. Insole Molding is used: (mark 1)

(a) To match foot shape (b) To match last bottom shape

(c) To match upper thickness (d) To match sole profile

3. Math the following (5 x 1 = 5 marks)

A) Toluene	1) for leather sole
B) Matrix skiving	2) Toe puff solvent
C) Insole molding pressure	3) Tool
D) Channel opener	4) 60- 80 bar
E) Sole trimming machine	5) 25 M.M

4. What is the use of matrix skiving m/c? (Mark 1)

5. What is the purpose of shank grooving m/c? (Mark 1)

6. What is the function of track roughing m/c? (Mark 1)

7. What is the function of sole trimming machine? (Mark 1)

Information Sheet 3 Handling and care requirements for materials are performed

2.2 Handling of different materials

Material may be defined as the regulation of the organization relating to procurement, storage and usage of material in such a way as to maintain an even flow of production without excessive investment in material stock. Material control involves control of three important functions.

- Procurement
- Storage

- Usage

Just as the handling of cash is of utmost important in case of non-manufacturing business, an efficient handling of materials is vital importance in the case of a manufacturing business.

Material constitutes an important part of cost of production of an article. This cost account for nearly 60 per cent of the cost of production of a large number of private and public sector organizations. Therefore, proper control in handling the material of a business plays a vital role in the success of the business. If the raw material or other spare parts are not available readily, there could be chances of loosing machine time and labor cost and which ultimately result in production loss.

The material can be divided into two categories:

1. **Direct Materials**: The materials which can easily be identified and attributed to the individual units are known as direct materials. These materials from part of the finished product. Leather, insole board used for manufacture of shoes are examples of direct materials. All cost which are incurred to obtain direct materials are known as :direct material cost".
2. **Indirect materials**: Indirect materials do not form part of the finished product and cannot be conveniently are accurately allocated to a particular unit of product. Examples of such materials are lubricating oils, cotton wastes and consumable spare parts required for the maintenance of machines etc. cost associated with indirect materials are known as "Indirect material cost".

Objectives of Material Handling:

Following are the objectives of material control:

1. Continuous availability of all types of materials in the factory ensures uninterrupted production. Lack of material may interrupt continuous production.
2. It can prevent losses caused by over stocking materials.

3. It can help maximum utilization of economy. Working capital may stick up by over stocking materials.
4. Material control provides information regarding exact position of stock available to the management. Frequent stock position is essential for better management of the business.
5. It helps the maximum utilization of storages capacity of the organization and can prevent losses during storage.
6. It can ensure the quality of material. Quality of material may decrees, if it is not stored properly.
7. Ordering right quantity of goods can save transport cost and handling charges.

Advantages of Material Control:

Following are the main advantages of material control.

1. It minimizes capital investment in the stock of materials.
2. It eliminates wastage and loss of materials arising on account of spoilage, theft etc.
3. It ensures uninterrupted production.
4. It reduces the cost of storages and transportation.
5. It aids the management to create proper purchase policies regarding materials.
6. It ensures the purchase of material at the reasonable price.
7. It facilitates the inventory control and valuation of closing stock.

Self-Check 2	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 8)**

Match the following words: (Each question has 1 mark)

01. Leather best stored at -------- degree c* temperature

(a) 0* to 10*c (b) -10*c to -20*c (c) 10*c to 20*c (d) 20*c to 30*c

02. The ideal atmospheric humidity level for leather is between

(a) 50-60% (b) 20-30% (c) 70-80% (d) 80-90%

Short answer questions: (Each question has 2 marks)

03. Explain about Direct material?

04. Explain about advantage of material handling?

05. Brief about handling and storage of V.T leather?

Information Sheet 4 Common problems and faults of materials are identified.

2.3 Common faults and problems for different materials

Leather sole

Leather defects that can be found in the finished leather can be classified into two basic groups.

NATURAL	**MAN MADE**
Growth marks	Brand marks
Hick marks	Flay cuts
	Flesh cuts

From these defects, mostly the man-made defects affect the quality and cutting value of the bottom leather and as such, these defects are described below.

BRAND MARKS: These are identification marks made on the skin of the animal, by the owner, using hot branding irons, which causes deep marks, resulting in damage to the skin or hide and resulting finished leather. Normally the brand marks are inserted in the butt area which is the area with the best leather.

FLAY CUTS: These operation by which the skin or hide is removed from the animal, is referred to as flaying. During the flaying operation, due to bad handling of the knife, sometimes deep knife cuts are made into the skin or hide, resulting in damage.

As these cuts are taken from the flesh side, of the skin or hide, they are not so visible from the grain side of the finished leather. Therefore when cutting bottom leather, the grain side as well as the flesh side, should be carefully inspected for such deep cuts.

Flesh Cuts: the removal of the excess flesh (soft tissue) from the skin or hide preparing it for the tanning process is referred to as fleshing and this operation is carried out by hand or by machine.

Specially during hand flashing, sometimes deep cuts are made on the skin or hide, due to the careless handling of the knife by the flashing operator.

They are also similar to flay cuts and should be inspected carefully from the grain side and flesh side of the finished leather, before cutting.

Common problem in leather sole:

1. Leather issued without considering grade.
2. Loss Leather.
3. Brand marks on the finished leather
4. Flay cuts on flash side
5. Flesh cuts on flash side
6. Thickness variation

Defects: Defects of leather include fiber quality, soft spots, brands, cockle, scratches, wrinkles, insect bites, grain damages, grub damage, cuts, skiving defects and fleshiness.

Natural markings: The subtle markings on leather are analogous to finger prints. They distinguish genuine leather from manmade materials. Other marks which can appear on the

surface of leather are healed scratches and scars, barbed wire marks, stretch marks, vein marks, wrinkles, brands and insect holes.

Insole board:

1. No uniformity of thickness
2. Creaking due to moisture
3. No flexibility
4. No resistance to shrinkage or growth
5. Dust and dirt on the board
6. No ability to hold tacks adhesives or stitches.
7. More bulky

Factors Of Deterioration:

Deterioration is a change of original state of any material by interaction between the object and the factors of destruction. The different types of deterioration of the cellulose board materials are reflected in wear and tear, shrinkage, cracks, discoloration, abrasion, hole, dust and dirt etc.

Humidity and Moisture: - Humidity is the amount of moisture in the atmospheric air. The moisture is measured in terms of relative humidity. All organic objects absorbs water to a greater or lower extent and the water goes inside the object through surrounding air. Because of this absorbency property, the fiber board absorbs more moisture when there is high humidity. Certain amount of humidity is necessary for the flexibility of fiber board but in prolonged high humid condition, board becomes wet and the moisture weakens the fibers of board.

Dust and Dirt:- Fine dry particles of any matter present in the air are known as dust. Since dust is air borne it settles down on any surface of the object

Heel:

a. Not good quality finish.

b. Color not matching.

c. Cracking on attachment.

d. Last bottom profile not match with heel

e. Size not matching

f. **I**nadequate pin holding strength

Toe Puff And Stiffener Sheet

1. No uniformity of thickness.
2. Less tack retention.
3. No ability to survive molding and shape retention.
4. Skiving problem.
5. Coating of adhesive not good.

Shank

1. Variation of thickness
2. Strength or performance
3. Length & width problem
4. Shank design not match

Self-Check 3	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 8)**

(Each question has 2 marks)

01. Write about common defects in V.T. leather?

02. What is a factor of deterioration of insole board?

03. Write about problem & faults in leather board?

04. What do you mean by brand marks?

Information Sheet 5- Identifying suitable personal protective equipment

The Need for Standard Operating Procedures with work place practice

Standard operating procedures continue to affect not only the entire flow of company procedures but also the well-being of an employee. Other than that, standard operating procedures offer a number of advantages such as the following:

- Quality control. Standard operating procedures guide employees and supervisors to achieve optimal output.
- Improve skills. With instruction clearly stated, employees, know what to do. They can continue doing their tasks until they achieve a certain level of proficiency. You may also see HR policy templates.

- Monitor performance. Standard operating procedures can help evaluate an employee's productivity.
- However, not everything is covered by standard operating procedures. We also offer an array of acquisition strategy templates that is applicable to assist your company in acquiring new resources, acquiring the services of another entity, or even acquiring and absorbing companies into your own.

1.3 PERSONAL PROTECTIVE EQUIPMENT

Every worker obliged to secure its qualified attendance through the respective training from the point of view of the safety or work attendance. The operative must be properly trained and acquainted with the danger existing on tools and equipment.

- Safety glass must be worn when using the grind stone.
- Always use a safe method to break a hacksaw blade; a small device can be used.
- Avoid wearing loose cloth.
- For female workers tide their hairs.
- Never carry around the knife with blade exposed, it could cause injury may be you and others.

Figure: personal protective equipment

1.4 SAFE MATERIAL HANDLING

Organization safety is extremely important both to staffs/ workers and managers and owners. Generally leather product processing is not as dangerous as many other manufacturing plants. Occasionally accidents can happen .It is easier and cheaper to prevent accidents before rather than later. In leather products some of the high inflammable materials are used, such as Rubber Solution, Dendrite, Rubber Sheet, Eva Sheet, Spirit, Synthetic material and others. But it is needed proper storage and maintenance. For Safety precautions we have to keep in our mind such as: –

- electricity :
  - Cables used should be good quality and high resistance,
  - Loose connection should always checked,
  - Fuses are too strong to protect current flow.

- fire :
  - Handling of inflammable materials such as adhesive, chemicals, spirits, rubber sheet etc are dangerous,
  - Due to loose connection can cause an accident,
  - Sourcing of metal causes small sparks which can glow for hours before igniting, usually occurs when nobody is around.

- electricity :
  - Cables used should be good quality and high resistance,
  - Loose connection should always checked,
  - Fuses are too strong to protect current flow.

- **others** :
  - Poor knowledge of machines and equipments
  - Poor conditions of tools and equipments,

- Bad condition of storage can cause of accidents,
- Poor knowledge of infrastructure planning etc.

1. safety and health
2. personal protective equipment

personal protective equipment

personal protective equipment menu workers' rights

hazards and solutions

the following references aid in recognizing the need for personal protective equipment (ppe) and provides information about proper ppe selection and usage.

related safety and health topics pages

- eye and face protection
- fall protection
- respiratory protection

- personal protective equipment. osha fact sheet (publication 3603), (2012). also available in portuguese and spanish. this is one in a series of informational fact sheets highlighting osha programs, policies or standards.
- personal protective equipment. osha publication 3151, (2004). this guide was created by osha and is intended to help employers in complying with osha's general ppe requirements.
- small business handbook. osha publication 2209, (2005). helps small business employers meet the legal requirements imposed by the occupational safety and health act of 1970 (the act), and achieve an in-compliance status before an osha inspection.

- osha technical manual. osha directive ted 01-00-015 [ted 1-0.15a], (january 20, 1999). section viii of the osha technical manual describes the various types of clothing that are appropriate for use in chemical operations and provides recommendations in their selection and use.

- eye and face protection. (july 2002). discusses selection of ppe for the eyes and face.
- electric power: personal protective equipment (ppe). (january 2010). discusses ppe often used in electrical work.

- personal protective equipment. centers for disease control (cdc), national institute for occupational safety and health (niosh). contains links to ppe related topics such as eye protection, hearing protection, skin exposures and protective clothing.
- recommendations for chemical protective clothing database. national institute for occupational safety and health (niosh), (february 1998). provides chemical protective clothing guidelines for chemicals listed in the niosh pocket guide.
- personal protective technology program. national institute for occupational safety and health (niosh), (june 2017). evaluates and improves equipment worn by workers and develops interventions to protect them from hazards.
- national personal protective technology laboratory (npptl). centers for disease control and prevention (cdc), national institute for occupational safety and health (niosh). focuses expertise from many scientific disciplines to advance federal research on respirators and other personal protective technologies for workers. also features links to ppe related topics.
- personal protective equipment compliance guide. the university of alabama. provides information to employers working toward compliance with certain provisions of subpart i of 29 cfr 1910.

- osh answers fact sheets: designing an effective ppe program. canadian center for occupational health and safety (ccohs). gives an overview of designing a personal protective equipment (ppe) program.
- personal protective equipment (ppe). u.s. department of health and human services, chemical hazards emergency medical management (chemm). provides a number of resources for managing an effective ppe program.

- assessment the need for personal protective equipment (ppe). osha. a guide created by the osha training institute intended to help readers to conduct ppe assessments, includes assessment checklists.
- personal protective equipment. osha. includes a ppe powerpoint presentation created by the osha training institute intended as an aid to authorized osha outreach instructors teaching ppe safety.
- ppe workshop lesson plan. national institute of environmental health sciences (niehs). applicable for hazardous waste worker and emergency response training. exercise for reinforcing and enhancing worker's knowledge of ppe.

- personal protective equipment (ppe). national ag safety database (nasd). some tasks on the farm contain hazards that must be done wearing personal protective clothing and/or specialized safety equipment if workers are to be safe. this page discusses various hazards and ppe typically found on farms.
- head, eye, and foot protection for farm workers. fact sheet penn state extension. discusses three types of personal protective equipment: protective headwear, eyewear, and footwear.
- solutions for living personal protective equipment for agriculture. university of wyoming extension. discusses equipment and clothing that can help farmers and ranchers remain safe when working around the many hazards on farms and ranches.

- emergency preparedness and response resources. national institute for occupational safety and health (niosh). addresses respirators, protective clothing, latex allergy and eye protection as they relate to emergency response settings.
- emergency response guidebook (erg). u.s. department of transportation, pipeline and hazardous materials safety administration (phmsa). provides guidance for firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving a hazardous material. this guidebook was developed jointly by the u.s. department of transportation, transport canada, and the secretariat of communications and transportation of mexico (sct).
- guide for the selection of personal protection equipment for emergency first responders. developed by the office of law enforcement standards at the national institute of standards and technology (nist) for the u.s. department of homeland security. guide 102–06 (2nd edition), (january 2007). provides information on personal protection equipment (ppe) for consideration by emergency first responders when purchasing and using ppe, including duration of protection, dexterity/mobility, laundering, and use/reuse.

- exemption for religious reason from wearing hard hats. std 01-06-005 [std 1-6.5], (june 20, 1994). osha instruction std 1-6.5 dated june 20, 1994 states that osha has granted an exemption from citations to employers of employees who, for reasons of personal religious convictions, object to wearing hard hats in the workplace.

Information Sheet 6 Common problems and faults of materials are identified.

2.3 Common faults and problems for different materials

Leather sole

Leather defects that can be found in the finished leather can be classified into two basic groups.

NATURAL	MAN MADE
Grwth marks	Brand marks
Hick marks	Flay cuts
	Flesh cuts

From these defects, mostly the man-made defects affect the quality and cutting value of the bottom leather and as such, these defects are described below.

Brand Marks: These are identification marks made on the skin of the animal, by the owner, using hot branding irons, which causes deep marks, resulting in damage to the skin or hide and resulting finished leather. Normally the brand marks are inserted in the butt area which is the area with the best leather.

Flay Cuts: These operation by which the skin or hide is removed from the animal, is referred to as flaying. During the flaying operation, due to bad handling of the knife, sometimes deep knife cuts are made into the skin or hide, resulting in damage.

As these cuts are taken from the flesh side, of the skin or hide, they are not so visible from the grain side of the finished leather. Therefore when cutting bottom leather, the grain side as well as the flesh side, should be carefully inspected for such deep cuts.

Flesh Cuts: the removal of the excess flesh (soft tissue) from the skin or hide preparing it for the tanning process is referred to as fleshing and this operation is carried out by hand or by machine.

Specially during hand flashing, sometimes deep cuts are made on the skin or hide, due to the careless handling of the knife by the flashing operator.

They are also similar to flay cuts and should be inspected carefully from the grain side and flesh side of the finished leather, before cutting.

Common problem in leather sole:

7. Leather issued without considering grade.
8. Loss Leather.
9. Brand marks on the finished leather
10. Flay cuts on flash side
11. Flesh cuts on flash side
12. Thickness variation

Defects: Defects of leather include fiber quality, soft spots, brands, cockle, scratches, wrinkles, insect bites, grain damages, grub damage, cuts, skiving defects and fleshiness.

Natural markings: The subtle markings on leather are analogous to finger prints. They distinguish genuine leather from manmade materials. Other marks which can appear on the surface of leather are healed scratches and scars, barbed wire marks, stretch marks, vein marks, wrinkles, brands and insect holes.

Insole Board:

8. No uniformity of thickness
9. Creaking due to moisture
10. No flexibility

11. No resistance to shrinkage or growth
12. Dust and dirt on the board
13. No ability to hold tacks adhesives or stitches.
14. More bulky

Factors Of Deterioration:

Deterioration is a change of original state of any material by interaction between the object and the factors of destruction. The different types of deterioration of the cellulose board materials are reflected in wear and tear, shrinkage, cracks, discoloration, abrasion, hole, dust and dirt etc.

Humidity and Moisture: - Humidity is the amount of moisture in the atmospheric air. The moisture is measured in terms of relative humidity. All organic objects absorbs water to a greater or lower extent and the water goes inside the object through surrounding air. Because of this absorbency property, the fiber board absorbs more moisture when there is high humidity. Certain amount of humidity is necessary for the flexibility of fiber board but in prolonged high humid condition, board becomes wet and the moisture weakens the fibers of board.

Dust and Dirt:- Fine dry particles of any matter present in the air are known as dust. Since dust is air borne it settles down on any surface of the object

Heel:

g. Not good quality finish.
h. Color not matching.
i. Cracking on attachment.
j. Last bottom profile not match with heel

k. Size not matching

l. **I**nadequate pin holding strength

Toe Puff And Stiffener Sheet

6. No uniformity of thickness.
7. Less tack retention.
8. No ability to survive molding and shape retention.
9. Skiving problem.
10. Coating of adhesive not good.

Shank

5. Variation of thickness
6. Strength or performance
7. Length & width problem
8. Shank design not match

Self-Check 3	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 8)**

(Each question has 2 marks)

05. Write about common defects in V.T. leather?

06. What is a factor of deterioration of insole board?
07. Write about problem & faults in leather board?

08. What do you mean by brand marks?

LG #37	. LO2. Perform bottom component operations

learning guide is developed to provide you the necessary information regarding the following content coverage and topics

- Types and sequence of operation for the preparation of the bottom components is identified.
- Interlocking for major components is performed.
- Prepare and cut toe puff and stiffener materials as per the specification of the footwear and procedure.
- Different types of insole are prepared as per the specification of the footwear and procedure.
- Leather sole is prepared as per the specification of the footwear and procedure.
- Heels are prepared and attached to the leather sole as per the specification of the footwear and procedure.
- Work area is cleaned and maintained according to OHS practices and enterprise requirements.

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify types and sequence of operation for the preparation of the bottom components is identified.

- Identify interlocking for major components is performed.
- Identify prepare and cut toe puff and stiffener materials as per the specification of the footwear and procedure.
- Identify different types of insole are prepared as per the specification of the footwear and procedure.
- Identify leather sole is prepared as per the specification of the footwear and procedure.
- Identify heels are prepared and attached to the leather sole as per the specification of the footwear and procedure.
- Identify work area is cleaned and maintained according to OHS practices and enterprise require

Information Sheet-1	Sequence of operations for different bottom components

3.1 Sequence of operations for different bottom component.

3.1.1 CONTINENTAL INSOLE

1. Cutting of Insole board.
2. Cutting of shank board.
3. Stamping.
4. Grooving of shank board
5. Matrix skiving of shank board.
6. Riveting/Attaching of steel shank on shank board
7. Cementing (a) Plain roller for Insole board.
   (b) Flexible roller for shank board.
8. Attaching of Insole Board and Shank Board
9. Moulding.

3.1.2 SANDWICH INSOLE

1. Cutting of shank board.
2. Cutting of Insole board.
3. Stamping.
4. Grooving of shank board
5. Matrix Skiving of Shank board.
6. Skiving of Insole Board
7. Riveting/Attaching of steel shank on shank board.
8. Cementing: a) Plain roller for Insole board.
   b) Flexible roller for shank board.
9. Attaching of Insole board and shank board
10. Molding.
11. Beveling.
12. Final Checking and packing.

3.1.3 WELTED INSOLE:-

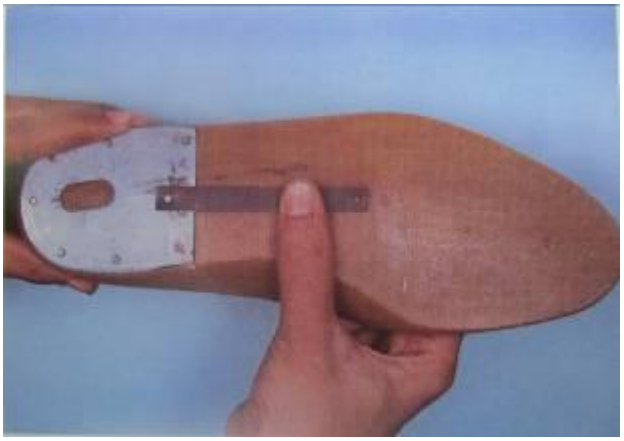
1. Cutting of Insole board.
2. Stamping.
3. Marking on insole board
4. Attach the rib through adhesive
5. Attach the cotton cloth
6. Final Checking and packing.

Note:- Quality should be checked in every operation.

3.1.4 BLENDED INSOLE:-

1. Cutting of shank board.
2. Cutting of Insole board.
3. Stamping.
4. Grooving of shank board.
5. Matrix skiving of shank board.
6. Skiving of Insole board. (Underlay skiving minimum 20mm.)
7. Riveting/Attaching of steel shank on shank Board.
8. Adhesive application on fore part insole board and shank board.
9. Attaching of forepart Insole board and shank board
10. Moulding.
11. Beveling.
12. Final Checking and packing.

Note:- Quality should be checked in every operation.



Selecting the steel shank.

Note: The following points to observe when selecting the steel shank.

a. The shank is the correct width and length and thickness.

b. Shank is fitted 1mm back from highest point.

c. Shank follows the bottom profile of the last. Specify shank by angle.

d. Shank should end 20 mm under seat of heel

Staple insole board

Note: The following points should be observed when selecting a suitable insole board.

a. Check the type of shoe construction.

b. The climate/market that the finished shoe is destined.

c. Board in pairs with plain side facing

Cut insole

Note: The following points should be observed when cutting insole.

a. Insole should be full to pattern.

b. Insole should be cut 1 pair at a time when using cold bend knives. 32 mm single edge.

c. Cut according to direction marked on insole board as above.

d. Cut 1 pair or 2 pair at a time.

Cut shank board.

Note: The following points should be observed when cutting the fiber shank board.

a. Shank should be full on pattern.

b. Cut with the grain of material

c. Never stamp on forepart of insole on plain side.

d. Stamp last no. & size no. on insole.

Stamping Insole.

Note: the following points should be observed when stamping insoles

a. Check insoles on pattern before size stamping.

b. Stamp is clearly readable.

c. Stamped to customers specifications

d. Use rubber pad inside the die for ejection of shank board.

Grooving of shank board

Note: The following points should be observed when grooving of the shank board.

a. Grooving should be centre of the sank board
b. Grooving as per the length of shank
c. According of shank width set the cutter

Matrix skiving of shank board.

Note: The following points should be observed when skiving the fiber shank board.

a. The end skive of 25 mm should taper to a fine edge. This allows for flexibility.
b. Edge skive should be to specification i.e. skive to zero

Riveting/Attaching of steel shank on shank board

Note: The following points should be observed when attaching the steel shank to the fiber board.

Cement Insole.

Note: The following points should be observed when cementing insoles.

a. A dust free environment should be used.

b. Insole should only be cemented upto the length of shank board using a guide.

c. Coating of cement should not be too heavy.

d. Insole should be kept clean of excess cement.

e. Test cement for bond strength.

f. Machine should run continuously.

Cement shank board.

Note: The following points should be observed when cementing the shank board.

a. A dust free environment should be used.

b. Not too heavy a coat of cement on board.

c. No excess cement on shank.

Attaching of Insole Board and Shank Board

Note: The following points should be observed when attaching the shank board to the insole.

a. Cement must dry on both surfaces.

b. Cement is not too wet as this will cause the shank when pressed.

c. When fiber shank is attached to insole it is evenly positioned

d. When positioned correctly you should press the two surfaces

Mould Insole.

Note: The following points should be observed when molding insole.

a. Always mold the insole to the shape of the last.

b. Make sure there is no wing in the insole when molded.(no gap between last and insole)

c. Never over mold insole as this will cause a break down in the materials.

Beveling.

Note: the following points should be observed when beveling insoles.

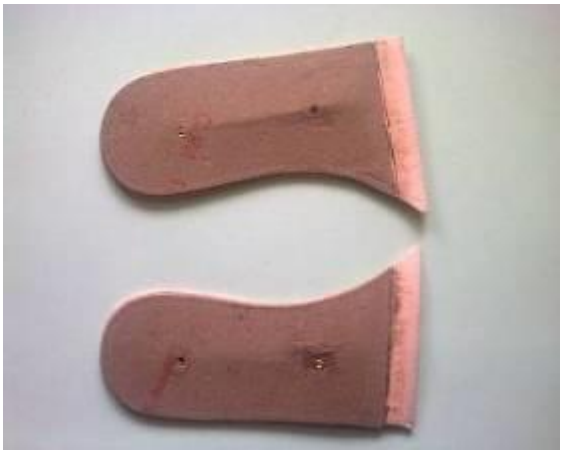
e. Angle of bevel will suit the heel to be used start and finish the bevel at the shank board joint.

f. Edge of the insole has a smooth and not rough bevel.

g. There is only one beveling angle for a last.

CONTINENTAL INSOLE

SANDWICH INSOLE



WELTED INSOLE

BLENDED INSOLE

3.1.4. Sequence of operations for making leather close trim sole

1. Clicking (cutting of leather sole)
2. Splitting (reducing thickness)
3. Leveling and roughing of flesh side

4. Edge pre-trimming
5. Stamping
6. Decoration/grooving
7. Edge inking
8. Track roughing
9. Sole seat roughing
10. Heel breast buffing with fine emery
11. Heel breast coloring and finishing
12. Buffing of the heel surface
13. Adhesive application on sole seat & heel
14. Heel attaching, pressing & stapling
13. heel scouring
14. Water application on edge and heel
15. Buffing with fine emery paper 150 no.
16. Filler application on heel and buffing with 180 no. emery paper
17. Color application on edge
18. Application of abrasive wax on cotton cloth brush & brushing the edge with the R.P.M. of 800.
19. Application of natural carnuva wax on woolen brush & finishing the sole with the R.P.M. of 1600
20. Final checking and packing

Note: If we want to make colored bottom sole, then after L&R, we will do snuffing color application before edge pre trimming and remaining process will be same.

3.1.4. Sequence of operations for making leather welted unit sole:

1. Clicking (cutting of leather sole)
2. Splitting (reducing thickness)
3. Leveling and roughing of flesh side
4. Edge pre-trimming
5. Stamping
6. Decoration/grooving
7. Sole seat roughing
8. Heel breast buffing with emery
9. Heel breast coloring and finishing
10. Buffing of the heel surface
11. Adhesive application on welt & flesh side of sole
12. Welt attaching
13. Adhesive application on sole seat & heel
14. Heel attaching, pressing & stapling
15. Heel scouring
16. Water application on sole edge and heel edge
17. Buffing with fine emery paper 150 no.
18. Filler application on heel and buffing with 180 no. emery paper
19. Color application on edge
20. Application of abrasive wax on cotton cloth brush & brushing the edge with the R.P.M. of 800.
21. Application of natural carnuva wax on woolen brush & finishing the sole with the R.P.M. of 1600
22. Final checking and packing.

Clicking (cutting of leather sole):

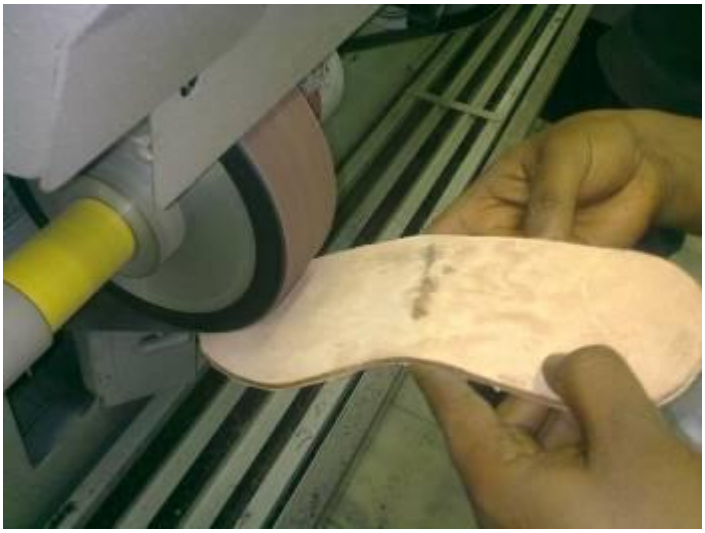
Note: the following points should be observed when clicking the leather sole.

- Check the cutting die with master pattern.
- Check the quality of sole leather (substance). Due to less thickness of material, sole can be rejecting.
- Don't cut from lose area.
- Before cutting, check the leather, there is no defects on grain side.
- Cut small piece like heel lift, top piece from bellies & shoulder area.
- Maximum utilize the leather, due to costly material.

Splitting (reducing thickness):

Note: the following points should be observed when splitting the leather sole.

- Check the gauge before splitting.
- Set machine according of leather sustenance is required.



Leveling and roughing of flesh side

Note: the following points should be observed when leveling and roughing of leather sole.

- Do not accept the loose fibers during leveling & roughing.
- Suppose the required thickness is 4.5 mm, & after getting leveled & roughed to this thickness the fibers are still loose, in that case we can remove the fibers up to 4.3 mm for getting tight structure. (2 mm is acceptable)

Edge pre-trimming

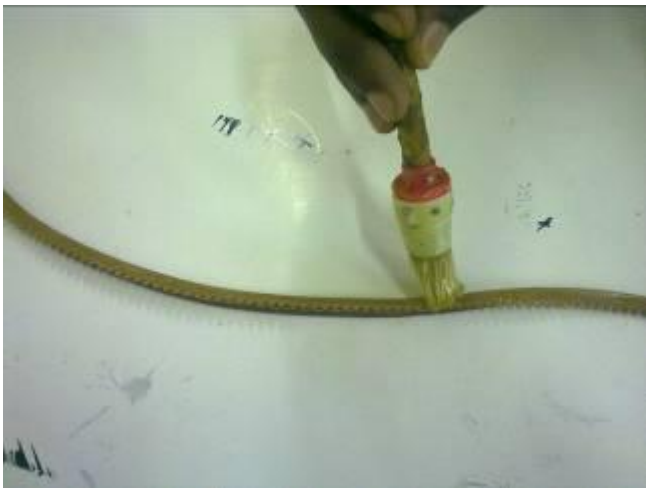
Note: the following points should be observed when edge pre-trimming of leather sole.

- Set the edge trimming machine before start working.
- Tin pattern should not flexible & fix tightly in the machine.
- Check cutter (as per the design/required edge of sole)
- After trimming check with outsole pattern.
- During edge pre-trimming care should be taken to avoid burning effect on edges.
- The R.P.M. of the cutter is 9000 to 10000, so the flow of the hand should be continues during operation.
- Edge pre-trimming should be according to specification of customer.

Decoration/Grooving:

Note: the following points should be observed when grooving of leather sole.

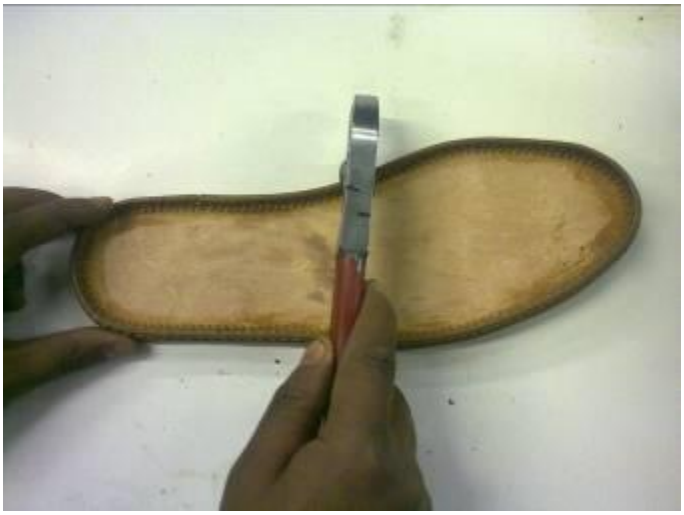
- Set guide roller (for how much distance from sole edge to groove/decoration).
- Grooving/Decoration as per design & material substance.
- Grooving/Decoration as per customer specification.



Adhesive application on welt & flesh side of sole:

Note: the following points should be observed when adhesives applying on welt & sole.

- Clean the surface of sole (where welt to be attach).
- Clean the welt.
- Apply past on sole & welt uniformity.
- Give proper drying time.
- Adhesive should be according of material.
- Adhesive apply only welt area of flesh side of the sole.



Welt attaching:

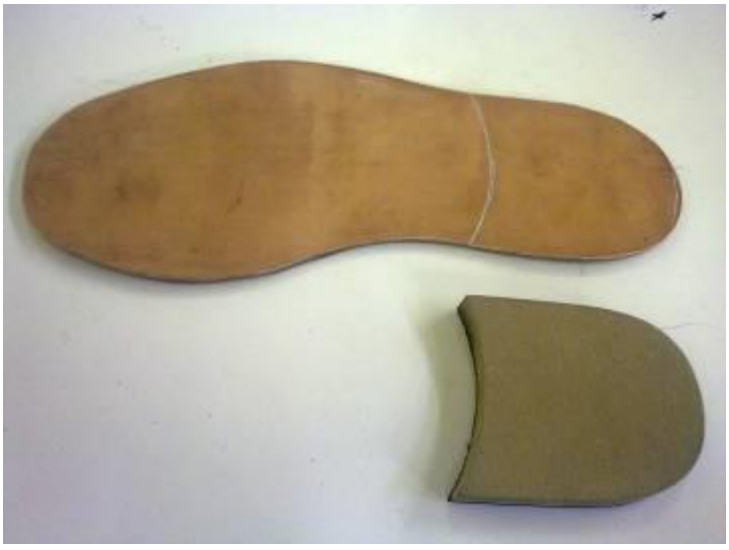
Note: the following points should be observed when welt attaching on sole.

- Welt should be attached properly as per the design of the sole
- After attachment of welt with sole press properly.
- Check with inner rand pattern (must be perfect).
- Welt should not open.
- No cavity between sole & welt.

Sole seat marking:

Note: the following points should be observed when sole seat marking.

- Marking as per heel design.
- Roughing 2 mm short from heel marking at seat portion.
- Marking should be grain side of sole.



Sole seat roughing:

Note: the following points should be observed when sole seat roughing.

- Roughing should not over from marking its 2 mm short from heel marking at seat portion.
- Roughing should be grain side of sole.

Adhesive application on sole seat & heel:

Note: the following points should be observed when adhesive apply on sole & heel.

- Clean the surface of sole (where heel to be attach).
- Clean the heel.
- Apply adhesive on sole & heel uniformity.
- Give proper drying time.
- Adhesive should be according of material.
- Adhesive apply up to roughing area of the sole.

Heel attaching, pressing & stapling

Note: the following points should be observed when heel attaching, pressing & stapling.

- Heel height should be same & pair wise in case of leather left & top.
- Top piece design should be pair wise.
- Heel cupping should be fixing with the sole without any cavity
- There is no gap between sole, welt & heel
- Heel nail or staple pin should be attached properly.

Heel scouring:

Note: the following points should be observed when doing heel scouring.

- Heel scouring is done after heel attaching process. In this process we carefully do scouring without damage the heel, welt & sole.
- Scouring with fine emery paper.

Edge Inking:

Note: the following points should be observed when doing edge inking.

- Apply color on the edges (wait for 15 minutes or according to weather).
- Color should be pair wise & match.
- Edge inking we have to do carefully otherwise ink tech to the other part of the sole, & it's not remove because leather absorb the ink.

Bottom polish:

Note: the following points should be observed when doing bottom polish.

Bottom polish is part of finishing process. Here we use the polish according of sole material like in leather sole we use abrasive wax & natural carnuava.

- Abrasive wax application on cotton brush & brushing the edge with R.P.M. 800.
- Natural carnauva application on woolen brush & finishing the sole with the R.P.M. of 1600.
- Bottom polish should be match pair

3.1.4. Sequence of operations for making resin rubber sole.

1. Clicking (cutting of resin sheet sole)
2. Stamping
3. Decoration/grooving (according of design & material)
4. Track roughing (if required)

3.1.4 Sequence of operations for making resin rubber welt sole.

1. Clicking (cutting of sole)
2. Stamping
3. Decoration/grooving (according of design & material)
4. Welt attaching

3.1.4.

Clicking:

Note: the following points should be observed when clicking the resin rubber sole.

- Check the cutting die with master pattern.
- Wastage should be less.
- Give maximum output done better interlocking.

Sole seat marking:

Note: the following points should be observed when sole seat marking.

- Marking as per heel design.
- Roughing 2 mm short from heel marking at seat portion.
- Marking should be bottom side of sole.

Sole seat roughing:

Note: the following points should be observed when sole seat roughing.

- Roughing should not over from marking its 2 mm short from heel marking at seat portion.
- Roughing should be bottom side of sole.

Adhesive application on sole seat & heel:

Note: the following points should be observed when adhesive apply on sole & heel.

- Clean the surface of sole (where heel to be attach).
- Clean the heel.
- Apply adhesive on sole & heel uniformity.
- Give proper drying time.
- Adhesive should be according of material.
- Adhesive apply up to roughing area of the sole.

Heel attaching, pressing & stapling

Note: the following points should be observed when heel attaching, pressing & stapling.

- Heel height should be same & pair wise.
- Top piece design should be pair wise.
- Heel cupping should be fixing with the sole without any cavity
- There is no gap between sole & heel
- Heel nail or staple should be attached properly.

Heel scouring:

Note: the following points should be observed when doing heel scouring.

- Heel scouring is done after heel attaching process. In this process we carefully do scouring without damage the heel, welt & sole.
- Scouring with fine emery paper.

Self-Check 1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 10)**

(Each question has 1 mark)

01. Sole grooving is use for ---------

02. Carnuva wax is use for ----------

03. Edge trimming machine used for --------

04. Function of track roughing machine is ----------

05. Matrix skiving is used for ----------

06. Heel scouring is come after ---------

07. Snuffing color application is done before ----------

08. Application of abrasive wax on the edge with the R.P.M ----------

09. Application of natural carnuva wax on sole with the R.P.M ----------

10. Decoration on sole comes after _____

Information Sheet 2- Interlocking for major components is performed

11. Heel breast is forward face of the heel? True/False (Mark 1)

1.2 Characteristics Of Insole Materials:

Insole from the base of the shoe on which the upper is lasted. When a shoe is used, the foot rests on the stage of insole and bring to bear all type of mechanical stresses. It therefore, provides protection to the foot along with the outer sole and also takes up moisture in the form of perspiration from the foot. Insoles may be half or full depending upon the construction and design of the shoe.

The properties for an ideal insole material are:

a) To absorb moisture readily and dry out quickly.

b) Durable enough to stand up to friction in wear.

c) Flexibility, and does not harden and harden and crack in wear.

d) Dimensionally stable (does not alter in shape in manufacture or wear).

e) Uniformity in thickness and quality.

f) Lightness in weight

g) Ability to hold tacks, adhesive, or stitches.

In footwear industry the following boards are used for insole making.

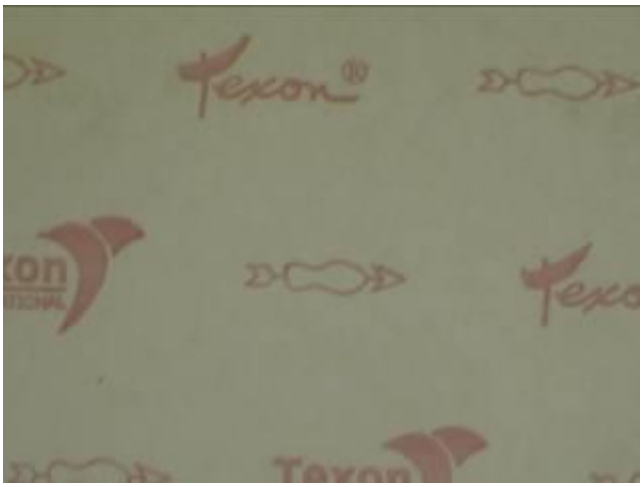
- Insole board/cellulose board
- Shank board/becker board
- Leather board
- Leather
- Steel shank

1.1.1 Insole board/Cellulose board:- Cellulose board for insole are made from wood pulp, resin and bonded with latex. As with leather boards it is supplied in sheet in various thicknesses, and in different grade. This material has better dimensional stability than leather boards.(i.e. does not shrink or grow). It is a flexible board. Common trade names are Texon, Bontex.

Typically women's insole use cellulose board of thickness 1.25 – 1.75 mm and men's insoles boards of thickness 1.5 – 2.25 mm. from a standard sized sheet of dimensions 150 x 100 cm about 33 pairs of men's insole can be obtained which translates to a usages norm of 450 square centimeter per pair of insoles. Similarly for women's insoles about 38 pairs can be produced from a sheet of 150 x 100 centimeter which is equivalent to suage norm of 395 square centimeter per pair of insole.

The characteristics of this material are:

a) Its ability to absorb moisture
b) Uniformity of substances
c) Resistance to shrinkage or growth (in change of humidity and heat)
d) Resistance to hardening or cracking due to moisture or perspiration.



1.1.2. Shank board/Becker board:- This is a very hard and strong fiber board, able to withstand the tremendous loads which occur in the waist and heel of the shoe. It is again produced in much the same as way as paper. However the main raw material is mixture of waste and recycled paper which, together with the vegetal bonding resins used in its manufacture, make shank board a very environmental friendly product. The molding quality of this type of board is less than cellulose board.

The standard sheet size of shank boards are 100 x 100 centimeter and the thickness is 2 – 3 mm.

The following raw materials are used for the manufacture of backer board;

a) Paper pulp
b) Dye
c) Hard resin binder
d) Aluminium sulphate
e) Preservative

1.1.3. Leather:- leather is not much used because of high cost and the lack of uniformity in thickness. Leather insole were usually cut from bellies (sometimes shoulders), and are now used only in very high quality footwear e.g. men's welted.

1.1.4. Leather board:- A flexible manufactured board made up with at least 75% leather fibers, which gives it the ability to absorb perspiration. It is made in sheets in various thicknesses (mm), and in different grade to suit particular shoe making requirements e.g. tack holding, cement bonding, high pressure/heat for injection molding. Common trade names are Ferrersflex, Articor. Many grades of leather board are available and this material extensively used in the footwear trade as a insole material as well as toe puff and stiffener.

Leather board is manmade material widely used by shoe industry. It is a compound of fibrous substance, vegetable matter and leather scrape bound together with latex rubber. Resin and alum are used in it while mixing. It helps to make the board more waterproof. The alum takes part to thicken with the latex.

General characteristics of a leather board:

a. Width, length, thickness can be made to order, as opposed to the varying thickness and sizes of leather pieces.
b. It has most of the quality and properties of leather.
c. Cheaper than leather.
d. For superior flexibility and durability as compared with card board or any other types of boards.
e. It retains the leather look, which other types of boards do not have.
f. Economic in manufacturing, the ingredients being are waste materials and by-products of trimmings and shavings from chrome tanned leather.

1.1.5. Shank:- A shank is one of the most vital components in a shoe. In providing essential support for the arch of the shoe, it has to withstand heavy bending and stresses whilst maintaining alignment of forepart and heel throughout all the stresses of shoe's life.

The Shank is a metal strip that from part of the insole. It maintains the longitudinal arch of the foot. Generally shank are made of high grade carbon steel which is properly tempered in order to impart the required material properties. In ladies high heeled shoes, the shank is shaped in such a way that it extends into the heel. Dimensions of typical shank are 10 mm width x 1 mm thickness and length of 85, 95, 105 mm as per size of footwear.

There are various material used for making shank.

Metal : are manufactured from steel. Two thickness of steel are commonly used 1.2 m.m. and 1.42m.m, the first being the more common. These are available in two widths: 9.5 m.m. and 12.7 m.m. although other widths and thickness are used.

Shank length (m.m.)	Minimum Total Shank Depths (m.m) for:	
	9.5 mm wide shanks	12.7 mm wide shank
Less than 50	2.18	1.22
50-74	2.82	2.18
75-99	3.40	2.82
100 and over	Not recommended	3.45

Wood: wooden shanks are not as strong as steel shank. But they are light in weight. Bamboo shanks are also used for a low heel shoes. In welted footwear a special board wooden shank is used which ultimately covers the space between welt ribs, doing an important job both a filler and a shank. Wooden shanks are skived to give a tapered edge at each end and along the side.

Plastic: the plastic shanks are the edition among the shank materials. It is generally used for the PVC unit soles. The shanks are made from polystyrene or polypropylene injection moldings. It is hard plastic but less inflexible than wood or steel shank.

1.2 Characteristics Of Sole Materials:

Soling material if we go back at 60 years in the shoe industry we will find that only vegetable tanned leather were used as a soling material. But during last 50-60 years there has been a significant change in soling material used in the footwear trade. The first major changes took place during 1940-50 when rubber was introduced as a soling material to replace leather mainly from cheap grade shoes but its durability attracts industry. The most significant development took place during 1960-62 were the introduction of shoe bottom molded directly using PVC or plastisol and subsequently introduction of PVC injection on process. This D.I.P. (direct injection process) made the shoe production faster and comparatively trouble free. The polyurethane soling material was introduced in the footwear trade in early 1970. Due to its light weight and higher durability it captured the massive market of platform unit sloes used for fashionable ladies shoes and sandals. Almost at the same time with P.U. soling/Thermo Plastic Rubber (T.P.R.) was also introduced in the market. This material provides a combination effect of both rubber and plastic. The soling material may be broadly classified in to two groups.

- Natural soling material
- Synthetic soling material

Sole the main function of the outsole is to provide grip as well as to reduce wear on the midsole thereby increasing the overall durability of the shoe. Early outsole units were made of leather or rubber and were modified according to the athlete's need. For example, early running shoes used for track events could best be described as leather shoes with nails driven through them. Today, the outsole for track shoes have plastic plates molded into them that allow a runner to change the spikes used depended on the day's event.

Early basketball shoes used a rubber compound that provide some cushioning but tended to wear out pretty easily. Little thought was given to traction relative to specific movements in basketball, like running vs turning, as well as to the type of surface the game was being played on. Today, basketball shoes reflect the need to address the differences between surface types, indoor wooden courts vs. outdoor concrete courts, as well as the understanding that frictional needs differ, depending on movement, in different areas of the outsole.

The ideal qualities for a soling material are:

a) Durability
b) Flexibility
c) Waterproof
d) Lightness in weight
e) Non Slip
f) Uniformity

Natural soling material

1.1.1 Vegetable tanned leather: is accepted in the trade as the most suitable soling material for high quality footwear, because it has all the essential qualities of good soling material except durability. The reason that is has now been superseded is due to the fact that it is too expensive for most types of shoe.

Most soles today are pre finished and because leather is not a uniform material in texture or substance, it does not lend itself to pre finishing.

Leather used soling is buff leather and various thicknesses from 4mm – 7mm. it is available as in Kg. weight unit.

Leather sole has the following advantages-

- It is one of the most 'hygienic' soling materials with case of perspiration as the upper leather.
- It gives product the unique/antique class & appearance as desired in high class footwear.
- Good sole bonding with upper cement due to fibrous structure present.

The main disadvantages of its usages are-

- It is very expensive sole and the cost further increases due to restriction of various regions.
- It is inflexible and sufficient heavy.
- Its processing is quite time taking, skilled and expensive.
- It is less durable especially in wet conditions.
- Cannot blend with modifiers as in polymeric soles to give a variety of properties.

Synthetic soling material

1.1.2. Resin Rubbers: In recent years, shoe sole of a type has now come to be Resin-rubber have become very popular, especially for ladies and children footwear because of its hard wearing properties. This product was first of all launched in market under the name of 'Neolite'. Similar to sole leather in general appearance.

It has the following characteristics-

- Hard wearing
- Waterproof
- Easily processed

- Readily stuck, sewn or nail –in

Note: The main defect of resin rubber is tendency to extend in wear, giving a cold feel in wear.

1.1.3. Microcellular Rubber (MCR): It is very widely used as a soling material in the shoe industry because it is very light in weight. It has a very good abrasion resistance and can be made in any colour as per the choice of the customer. The micro rubber has pores which are extremely small.

Advantages are:-

1. Lighter in weight, provides more comfort.
2. Better shock absorption than solid rubber.
3. High flex crack and slip resistance.

4. Abrasion resistance is better than vegetable tanned leather sole but not as good as most solid rubber compound.

5. Good ground insulating qualities.

Disadvantages:

1. Micro cellular rubber has a tendency to shrink about nearly 10% of the original expansion after it removes from the press.

2. Wear resistance is not very good.

1.1.4. Mesonite Heels: Mesonite is a type of hardboard made of steam-cooked and pressure-molded wood fibers. Forming the fibers into boards on a screen, the boards are then pressed and heated to form the finished product with a smooth burnished finish .The long fibers give Mesonite a high bending strength, tensile strength, density and stability.

1.1.5. Plastic Heel:

Although the function of the heel in footwear design is difficult to justify, heels have been an important part footwear since the 16th country. The last three decades, in particular, have seen major development in design, materials, and method of manufacture. Heel have aborned shoes in variety of shapes and size, from short and thick to tall and slim, from wedge – shaped to square – shaped.

More recently new materials have been introduced, providing fresh design scope and new methods of shoe making, wood, the traditional heel and associated shoemaking problems. We shall examine type of heel, their manufacture, and the evaluation of heels and their attachment.

Many different heel types are used in modern footwear. The most common types for women's shoes in injection – molded plastic, although turned wood heels and built heels are still used. Built heels, however are used mainly on men's shoes.

This is molded heel and any type of plastic material, which is capable of being molded to shape, may be used for this purpose. But considering the various requirements of heels "high Impact Polystyrene" (HIPS) is the most suitable material for this purpose to make a heel.

Injection – molded heels:

The two main styles of heel made by the injection – molded process are the cavity – molded 'chunky' heels for both men and women and stiletto heels.

Chunky heels: The most common materials used for this type of heel are polystyrene, ABS (Acrylo nitrile-butadiene-styrene), polypropylene and expanded plastic.

Nearly all chunky heels used now –a –days are molded from high coloured. The latter need to lacquered as they don't give very good quality finish. The best grades must be used so as to avoid brittleness and cracking on attachment, which is the main fault with chunky heels.

The use of ABS in chunky heels has been limited to heels intended for electroplating it is harder than most grades of polystyrene and so heel – attaching pin require greater pressure for insertion. Consequently, its pin-holding strength is greater. ABS is available in self-colored form and lacquering is necessary.

Polypropylene has been used only on a limited scale for chunky heels because it is more difficult to mould than polystyrene and is slightly more expensive. It has excellent impact and fatigue resistance and does not become brittle.

Although expanded plastic would appear to be a good choice for covered chunky heels particularly where lightness of weight is required because of its inadequate pin holding strength, it is not recommended unless a solid insert is used in the seat to take the attachment grindery.

Plastic chunky heels are produced by conventional injection molding techniques. All heels are molded in a multi-cavity mould. The mould used is called a hot runner mould. Heels are injected close to centre of the seat surface. After release from the mould, the heels are immersed in water for cooling.

Stiletto heels: For stiletto heels, the most widely used plastic is polystyrene, but other materials used include ABS(Acrylo nitrile-butadiene-styrene), polypropylene, polyacrylate, nylon and expanded polystyrene.

When stiletto heels were fashionable in the 1950's they were usually made from polystyrene, which was relatively cheap and freely available other plastics were tried, but most were eventually dropped in favor of polystyrene, which was stronger, easier to mould and lacquer, and less expensive. With the return of the stiletto heel in the late 1970's the best grades of high-impact, toughened polystyrene were still being recommended.

Most of the strength of a stiletto heels in its steel reinforcement. Nevertheless, a plastic compound with adequate impact and fatigue resistance must be used to prevent stem breakage. Breakage in wear occurs in two ways- either by a sudden sharp impact or wrench, such as in stepping off a bus or getting caught in a grating, or else by fatigue built up by the repeated small impacts of normal walking. To combat both type of failure, the plastic must have good fatigue resistance and brittle grades must be avoided.

Like chunky heels, plastic stiletto heels are produced by conventional injection-molding techniques. Hot runner molding was adopted during the 1960's when stiletto heels were in fashion. It superseded gate molding, which involved injection the heel from the centre of the

breast edge. One reason for changing the position of the injection point was to change the direction of flow of the stream of plastic to eliminate flow lines that formed down the stems near the tip. This was not important when heels were covered, but it was unsightly on lacquered heels.

Steel rod reinforcing inserted are either molded in or inserted after molding. when they are molding in, they have to be located on a spigot at the trip end of the mould cavity.

This delays the moulding cycle, and for this reason some manufacture prefer to reinforce after moulding by inserting the steel inserts into drilled stems.

Many different types of reinforcing insert have been used, but steel is the most satisfactory and allows for extreme heel shape. Medium –hard steel is suitable for the most heels, and if failure occurs in wear, the inserts usually bend rather than break, minimizing injury to the wearer. Some grades of hard steel that have not been correctly heat treated will break readily, usually when the plastic breaks.

Three types of steel insert are suitable for stiletto heels – solid rods (drilled at the tip), tension pins, and solid rod inserts with top-pieces attached.

1.2 Characteristics Of Toe Puff And Counter Stiffeners

Even with the current demand of less structure footwear, particularly in the search for foot comfort, the toe- puff & stiffener are still one of the most important ingredients in the production of footwear. Whether it is the high fashion, welted, or even sports shoes most of it requires reinforcement at the front and back side of the shoe. We have a wide variety of both the materials and also the several application techniques to suit both the application as well as artistic look of the footwear.

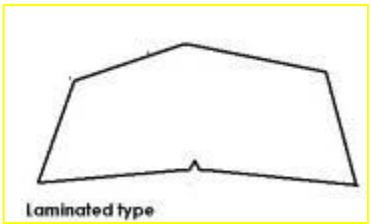
From the wearer's point of view both perform a similar function in maintaining the shape of the footwear and both must have a good wear performance which necessitates the ability to retain their shape & strength when repeatedly collapsed or exposed to moisture.

Additionally, a toe-puff should be able to flex with the foot in wear without causing discomfort or creasing.

The required hardness of the toe-puff and stiffener depends on the type of footwear. In lightweight casual shoes, soft materials are sufficient. Also the properties and shape of toe-puffs & stiffeners are influenced by fashion trends.

a. Flat Stiffener

This could be both solvent activated and Heat Activated and Cut from the sheets as per pattern to insert at the time of lasting.

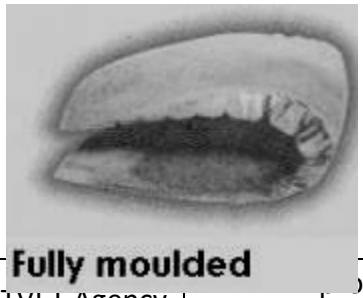


b. Semi Molded Stiffener

Stiffener is added in closing section itself, Stiffener is finger molded before insertion. This type of stiffener is thermoplastic and needs to be softened by heat at some stage of lasting process.

c. Fully Molded Stiffener

High quality shoemakers who wish to use high-grade leather board stiffeners often use this type of stiffener. The stiffener manufacturer molds it to the shape of the back of the last and the flange is molded in



1.1.1. Solvent Activated

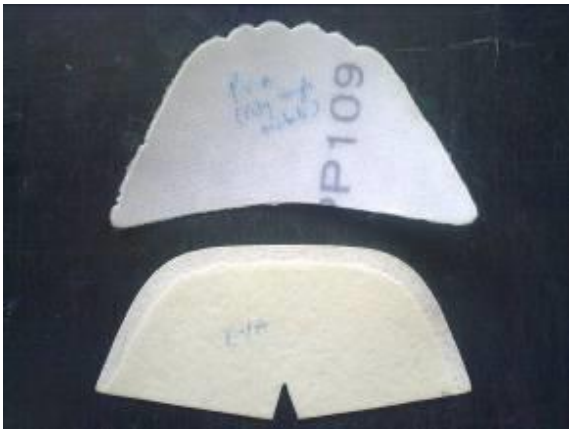
These puff are impregnated with either nitrocellulose or polystyrene resin. Polystyrene has recently become popular as the impregnating resin in solvent activated puffs. Production of the polystyrene sheet material is similar to that for the nitrocellulose type. The solvent blend to activate the puff should contain toluene, which dissolves more readily then the resin.

With all solvent activated materials, thorough activation is essential so that the materials easily conforms the shape of the back & fore part of the last. It is also essential that some portion of solvent is still present while lasting. However too much solvent's presence leaves the stain marks in the lining as well as upper.

The toe-puff must immediately be applied to the upper. The bonding takes place only when the toe-puff has sufficient amount of solvent in it.

1.1.2. **Thermoplastic Materials:**

Adhesive coating on heat – activated puff (for heated press application) are based on P.V.A (poly vinyl acetate), E.V.A.(ethylene vinyl acetate),polyacrylate, polyurethane. Resin and plasticizer are added to impart the required adhesive properties. More recently, hot melt adhesive have been used. The adhesive is heated to 120-140 C and is applied as single coating.



The following recommended uses of various types and thickness of puff are given as guidelines rather than as hard and fast rules.

	Solvent activated fabric-based puffs		**Thermoplastic**
	Cellulose – Nitrate impregnated	**Polystyrene impregnated**	**Polystyrene impregnated**
Women's shoes	0.7-0.9 mm	0.5-0.8 mm	0.4-0.7 mm
Women's heavy shoes and boots and children's and men's light shoes.	0.9-1.2 mm	0.8-1.0 mm	0.7-1.0 mm
Men's and Boy's shoes	1.2-1.6 mm	1.0-1.2 mm	1.0-1.2 mm

Men's heavy shoes industrial boots and sports shoes	1.6-2.0 mm	1.2-1.6 mm	1.2-1.5 mm

1.1.3. Steel Toe- Cap: These toe caps we use in safety shoe Steel protective toe caps are extremely hard and difficult to damage. They are heavier than aluminum or plastic toe caps, and bend under pressure, anti-rusty.

1.1.4. Plastic Toe- Cap

Superior strength-to-weight ratios. At the same strength, thermoplastic plastic shoe toe is 50% and 20% lighter than using steel and thermosetting plastic respectively. No rusting, excellent corrosion, chemical and climate resistance.

Self-Check 2	**Written Test**

Test I

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. (Total marks 12)

1. for machine lasting, Toe puff used is- (Mark 1)

(a) Solvent activated (b) Heat activated (c) Ceramic (d) Leather

2. Abrasion resistance of Shoe Sole helps (Mark 1)

(a) Longevity of Shoe (b) Flexibility of Shoe (c) Both (d) None

3. Toluene is use for (Mark 1)

(a) thermo-plastic toe puff (b) Solvent activated (c) Leather toe puff (d) None

4. Soling material may be broadly classified in to (Mark 1)

(a) One groups (b) Two groups (c) three groups (d) four groups

5. Cellulose board for insole are made from (Mark 1)

(a) Leather (b) wood pulp (c) paper pulp (d) none

6. Full name of P.V.A. is ……. (Mark 1)

7. Full name of MCR is …… (Mark 1)

Test II (Mark 5)

1. Write the characteristics of insole board?

2. Write about MCR sheet?

3. Write advantage & disadvantage of V.T. Leather?

4. Describe about Plastic heel?

6. Write the characteristics of leather board?

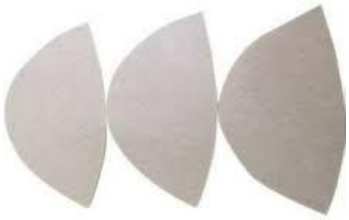
Information Sheet 3-Identifiction Prepare and cut toe puff and stiffener materials

Problem and fault identification and analysis for toe puff & counter stiffener

1. Issue material daily without norms.
2. Do not have a job register for the cutter.
3. Never store toe puff & stiffener sheet face to face.
4. Never check dies daily with master patterns for distortion.
5. Do not display sequence of operation chart. This will help operators innovate in your absence. This guarantees inconsistency.
6. Issue master patterns to production without keeping copies so that they get lost/torn.
7. Skiving not proper as per the specification sheet.
8. Never test toe puff & stiffener in the laboratory.
9. Ensure you are totally ignorant of toe puff & stiffener standards for laboratory test or type of tests.

10. Change operators.
11. Change operators from one operation to another without training.
12. Do not buy enough trays/trolleys. Keep goods on the floor as far as possible.
13. Do QC but never tell him what to check. No Qc records

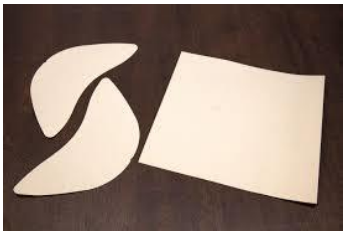
Check if this happens in your factory. If you know the problem and yet do not solve it, amounts to absolute negligence



Toe puff material | toe stiffener ...

How to Make Shoe Toe Puffs

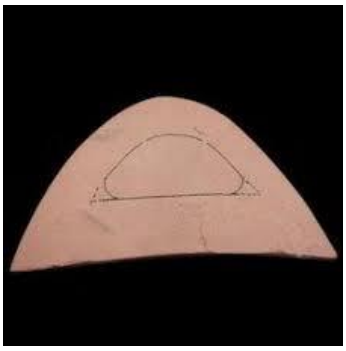
.. Toe Puff Stiffeners for Shoe Making ...



Toe Puff Stiffeners for Shoe Making ...

Toe Puffs

Welted tutorial II. – Lasting the Toe .puff. and Counter Stiffener



Toe Puff Stiffener

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Welted tutorial II. – Lasting the Toe. puff and counter stiffener materials

..

Welted tutorial II. – Lasting the Toe puff and counter stiffener materials

Toe Puff Stiffener to Your Shoes ...

Self-Check 4	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 4*2=8)**

01. Write at least 2 points problem & faults for insole in industry

02. Write at least 2 points problem & faults for leather sole in industry

03. Write at least 2 points problem & faults for resin sole in industry

04. Write at least 2 points problem & faults for toe puff & stiffener in industry

Information Sheet 4- preparing different types of insole

1 Use of different materials:

Leather board: Leather board is a man made material widely used by shoe industry. It is a compound of fibrous substance, vegetable matter and leather scrape bound together with latex rubber. Resin and alum are used in it while mixing. It helps to make the board more water proof . The alum takes part to coagulate with the latex. The basic ingredients can be divided in two groups:

FIBROUS : Leather, wood fibre, waste paper, old rope

NON FIBROUS: Resin, alum, latex

Purpose in use: It is a semi-rigid material used as bottom components of a shoe. These are meant to provide support to lasted upper as in case of insole.

A leather board, in its construction is fiberboard. Its major ingredient is, leather fibre, that is, fibre animal protein. There are three types of leather board :

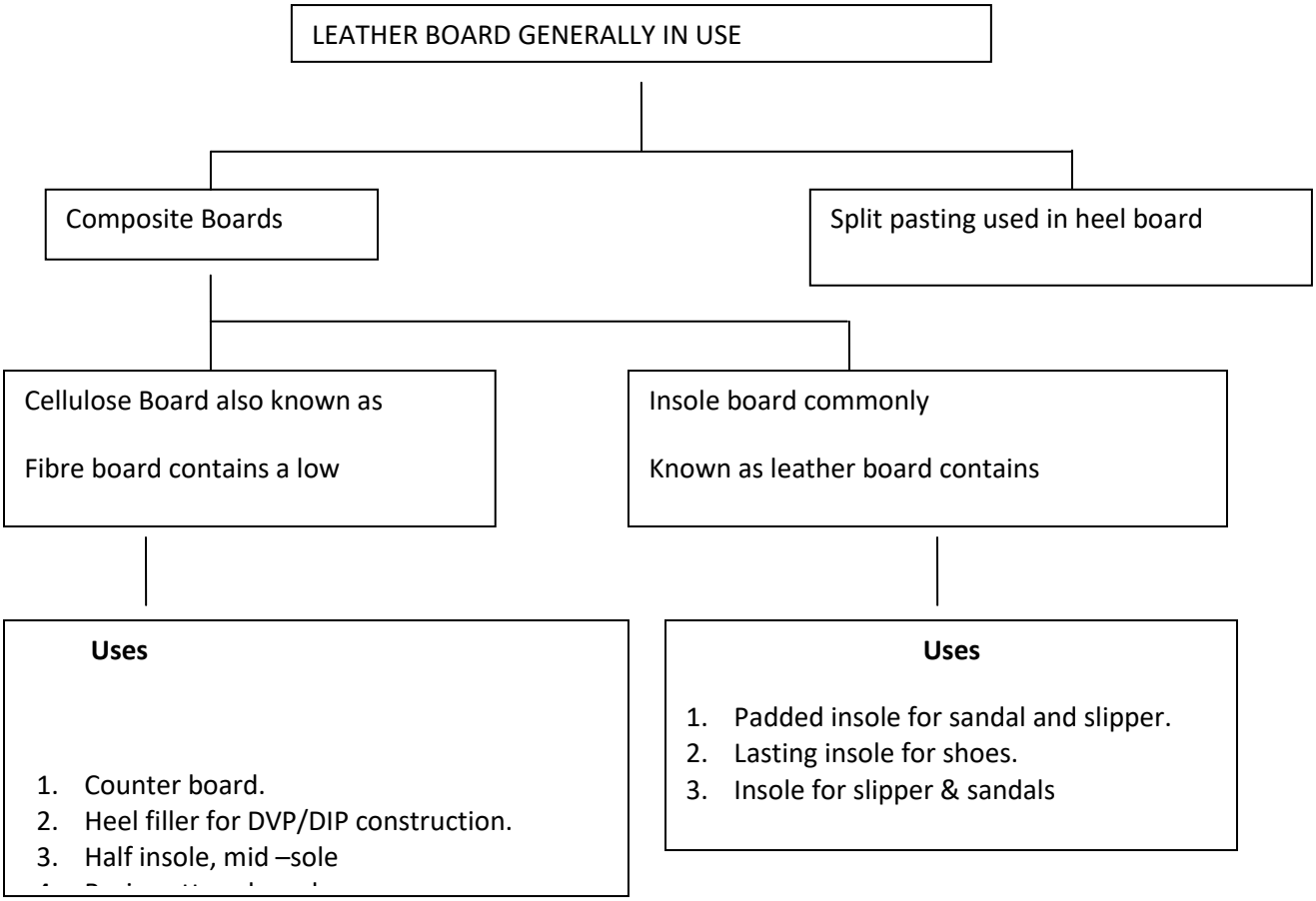
Leather Board: This is composed of leather scrap bonded with rubber with 75% or more of the fiber content being leather.

Fiber Board: This is composed of vegetable matter with only a low percentage of leather.

Layer Board: It is mainly composed of leather splits. Split leather soaked in warm water and stuck together with paste adhesive. These boards are mainly used for making heels.

You can get your required properties of board by changing the proportions of ingredients while making the board. Rubber contents of the board will greatly improve the flexibility and stitch –

tear strength of the board. Fiber board with high cellulose i.e. vegetable matter content tends to have good tensile strength but not flexible



Leather board is mainly used for different purpose for the leather industry.

Insole board : leather board is widely used by the shoe industry as an insole. The insole is a major part of the shoe. It plays a great part in shoe making. The lasting of a shoe generally done either by adhesive or by tacks, staple and stitching. As such a leather board must have good stitch – tear resistance and the ability to hold tacks, staple and adhesive. It must have capability to withstand the heat during vulcanizing and direct injection processes. It also has a good tensile strength to resist various strains put upon during the making process.

The properties of insole board:

1. Good stitch-tear resistance
2. Ability to hold adhesive, tacks and stitches.
3. Good tensile strength
4. Ability to withstand heat upto 180^{o}C
5. Good degree of flexibility
6. Even substance
7. Good water absorption and also ability to dry quickly.

Stiffener or Counter board:

Leather board is also used for making counter stiffener. It must therefore be stiff but resilient in order to give support and shape without causing any discomfort to the wearer. The board should mould easily and retain the shape as per mould after moulding. This board should be strong enough to stand upto the forces applied during moulding without splitting or tearing

Properties of counter stiffener board:

1. Stuff but resilient
2. Ability to withstand moulding and shape retention.

3. Light in weight and even substance.
4. Must cut & skive easily
5. Ability to hold tacks and stitches.

Heel board:

Leather boards are the right choice for selection of heel materials. This is a soft thick board and contains a high proportion of leather. It is used for making build and stacked heels. These heels are made by gluing together several layers of heel boards. These boards are then compressed in a machine to make into laminated heel blocks.

The properties of heel board:

1. Must not break a part when compressed.
2. Must have ability to trim cleanly.
3. Must be free from foreign materials.
4. Must be light in weight & even.
5. Must have the ability to hold tack, nails and slugging pins.

Backer board : This is the back part of an insole that goes over the heel of the shoe and under the arch of the foot, because it has to bear weight and give certain amount of support. As such it must be rigid and strong. Fiberboard is the right choice for this purpose because it contain high cellulose content.

Properties of backer board:

1. Must be rigid.
2. Must be strong
3. Must have ability to be moulded and retain shape after moulding
4. Ability to hold tacks
5. Ability to cut clean.

Pattern board: This board is mainly used for making patterns from which hand cutting is being made. This board is also used as basic patterns for making knives or as basic patterns for grading paper pattern in machines.

Properties of pattern board;

1. It must have dimensional stability.
2. It must lie flat.

RAW MATERIALS FOR FIBER BOARD

Fiber boards are made from a variety of vegetable materials such as wood pulp, waste paper and other cellulose substance, and from animal fibers derive leather scrap.

These fiber vary from being short and weak to being long and tough. Cellulose fibers generally tend to bond together fairly well when pulped, whereas leather fibers do not and therefore normally require the addition of a bonding agent.

The price of fiber scrap and raw fibers various considerably, according to their availability and their stability for board making and some of the newer bonded-cellulose insole boards, which are made from high-grade pure cellulose fiber, are particularly expensive.

Different types of cellulose material

Wood pulp: This cellulose material is produced from wood by mechanical grinding and disintegration or by chemical digestion with acid(the sulphite process). Or with alkali, (the Kraft process). The mechanical process produces a cheap inferior pulp that is difficult to wet back because it consists of the whole wood, resinous matter and lignin, has low strength

By treating the fibers in different ways and adding various fillers or bonding agents, boards that offers different characteristics.

Waste paper: This is much cheaper than wood pulp and widely used in board manufacture. It is available as sorted grades or as mixed waste. The quality of the waste paper greatly effects the quality of the boards.

Animal fibers : These are usually leather scrap from tanneries and footwear factories, this scrap comprises both vegetable tanned and chrome-tanned scrap, each of which is bought and kept separately.

Binders: In manufacture, all these fiber are chopped or ground, and then bonded together with rubber latex, resins or starch. High quality cellulose boards are bonded with synthetic neoprene latex.

There are some important components of shoe, which are made from fiberboard.

- Insole board
- Shank board
- Counter stiffener
- Toe puff

SHANK:

It is relatively stiff and firm component generally made with metal or wood. It is placed in between waist of the shoe. It prevents the flexing of the waist portion during walking. In case of metal shank it is normally molded. The longitudinal curve of shank must follow the curvature of the last waist. The shank must not visible on the finished shoe.

Function of shank: Heel forces the insole to form a bridge between heel breast and the joint(tread line). As we know that insole is the foundation of the shoe as such this bridge must be supported to prevent it from collapsing. This is the principal job of shank. The role of a shank becomes more critical with increase of height of heel. The shank also acts as filler in the narrow waist strip between the lasted margins.

Material used for making shank

There are various material used for making shank.

Metal : The most common metal used is carbon steel which contain 0.5% to 0.55% of carbon. Others component are silicon, manganese, sulphur and phosphours. From the requisite steel strip the shank piece is cut as per size and holes are being punched if required. The raise section of the steel shank is know as flute.

Wood: Wooden shanks are not as strong as steel shank. But they are light in weight. Bamboo shanks are also used for a low heel heeled shoes. In welted footwear a special board wooden shank is used which ultimately covers the space between welt ribs, doing an important job both a filler and shank. Wooden shanks are skived to give a tapered edge at each end along the side.

Plastic: The plastic shanks are the edition among the shank materials. It is generally used for PVC unit soles. The shanks are made from polystyrene or polypropylene injection moldings. It is hard plastic but less rigid than wood or steel shank.

BOTTOM FILLER:

Filler means the materials which fills the cavity or gap. Bottom filler is a kind of material which fills the cavity formed during the lasting. Almost all type of footwear needed bottom filler. It may be in the forepart, heel portion or whole of the bottom areas.

Purpose of the bottom filler:

Through most of the footwear needs bottom filing but their purpose may be different.

Filling the cavity created by lasting:

All most all the shoe has cavities and it is essential to fill the cavity properly before putting the sole on it. Otherwise bottom shape will be unattractive and will also be a cause of discomfort to the wearer. In the case, thickness of the upper material will be the exact thickness of the

bottom filler. But in the cases of welted construction the thickness of the bottom filler will be more due to the depth of the welt and rib.

Reduction in cost – helping in the process:

This happens only in the case of molded footwear either in form of vulcanized rubber or in the form of PVC injected shoe. Actually what happens, the filler cut down the amount of rubber/PVC needed for bottom of the shoe. It does not hamper the quality of the shoe. As the rubber or PVC granules are expensive than the filler used, it reduces the cost of the bottom material. Special care to be taken while attaching bottom filler for a PVC injected shoe because during injection it apply a tremendous pressure through its nozzle to the bottom cavity which can displace the filler, if not attached strongly, damaging the whole bottom of the shoe. Practically it does the following

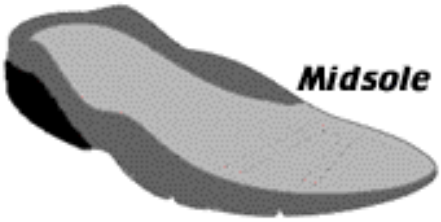
a. Reduce the weight of the shoe.
b. Reduce the cost of shoe.
c. Speed up the cooling and thus reduces the operational time.

Following are the materials used for the bottom filling.

1. Jute felt
2. Granulated cork mixers
3. Textile / foam material
4. Wood - light weight wood for PVC injection molding shoes.
5. Insulation board
6. Re-constituted foam
7. Felt paper
8. Waste leather piece / bottom splitting

9. Split leather

MIDSOLE:



The shoe sole between the outer sole (which contacts the ground) and the shoe upper. It is made of a variety of materials to give the shoe various characteristics of cushioning, support, and flexibility. Different colors of materials show the different densities - usually the denser and more supportive polyurethane is in gray, with the lighter and cushier EVA in white. The more gray, the more support. The more white, the more flexible and cushioned.

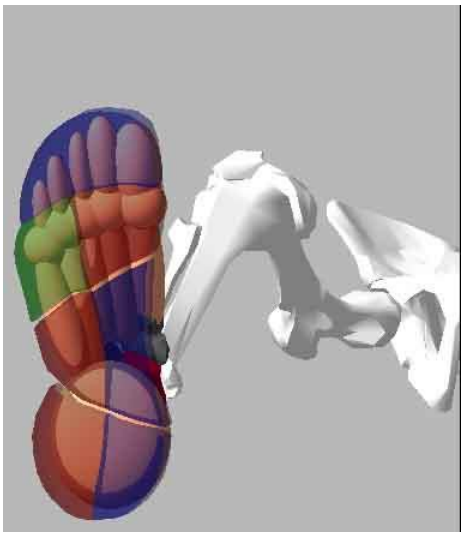
The midsole are the focus of a shoe's cushioning system. An argument could be made that no part of the shoe has benefited from science more and affects performance more than the midsole. In early athletic shoes, especially in running shoes, midsoles didn't really exist. Early basketball shoes had some rubber cushioning inside them, but nothing along the lines of modern midsoles. Not until an athlete with an interest in shoe design started thinking about running shoes and how they could be improved to reduce injuries and allow for more training did the invention of the midsole as we know it exist.

The original idea for the midsole, itself a study in how an inventive mind works, utilized a shower sandal glued between a nylon upper and outsole of a simple running shoe already on the market. This invention was given to running friends to test and provide feedback. Out of

this simple innovation, for which a number of patents have been issued, grew the plethora of midsole "innovations" we see today in every type of shoe from walking to basketball. The innovations range from improved foam midsoles to complicated air and fluid systems.

The properties required in midsole are as follows:

Stability - As the importance of cushioning systems became the central focus of midsole research and design, the midsole's contribution to overall foot and ankle stability was somewhat ignored. The reason for this is interesting in that it was driven by the boom in the running movement, by people's in-store perception of what a good cushioning system "felt" like, and by surveys in running magazines as to the "best" cushioning offered in shoes.



The solution to this was to pay attention to cushioning as well as modify parts of the midsole to enhance stability. Support structures like heel collars that are extensions of the midsole that, in many cases are integrated with the upper, seem to answer the need to balance the cushioning as well as the stability needs of a particular sport and athlete.

Cushioning - As mentioned earlier, this is the main focus of the midsole system. The need to deal with the impact forces that an athlete encounters during sport, over seven times the body weight in sports like basketball, is of paramount importance when designing a midsole unit. How the midsole deals with these forces is dealt with under the section of this guide dealing with impact testing later, but the basic idea is to help spread out the force of impact so that it is

not delivered full force straight to the foot and legs of the athlete.

The cushioning needs of an athlete are closely tied to an individual's biomechanics as well as to the specific sport the athlete is participating in. For example, a person's biomechanics (as defined by the bones, muscles, ligaments and tendons) might be such that they area heel striker rather than a forefoot striker when running. In general, a heel striker exhibits a key, potentially injurious, impact force at the beginning of a stride cycle that is not seen in the impact record of a forefoot striker. What this means is that the design for a midsole system for a heel striker must pay particular attention to cushioning in the heel area.

In turn, the cushioning system also plays a key role in the overall energy consumption of an athlete during an event. The natural cushioning system of the body is the musculoskeletal system--the bones, muscles, ligaments and tendons, of the foot and leg. The fat pads in the foot also play a major role in protecting the foot from sudden and repeated impact. Operating this system requires the use of the body's stored energy as it is dependent on muscles contracting to help deal with the impact going through the system. This works fine under normal conditions, like relaxed walking over soft surfaces. When an athlete asks more of this system by increasing the frequency and force of impacts through training and participation in athletic events, more energy is needed to help maintain performance. A shoe's cushioning system can help by improving the efficiency of, or reducing, the energy needs of the athlete.

A good midsole design is one that provides some type of energy return to the body when compressed. This energy return or spring gives lift to the foot and leg that normally would require muscular contraction, and therefore cost the athlete in terms of energy.

Durability - In midsoles, traditional cushioning systems based on rubber or foam materials tend to break down, or compact, over time. As they break down they lose their ability to cushion and

provide energy return. The way these materials break down is related to how they are constructed. Basically, the way to increase the cushioning characteristic in a rubber or foam based midsole is to increase the amount of air blown into the material. This air produces bubbles. The larger the bubbles, the thinner the walls surrounding them. The thinner the walls the shorter amount of time needed to break them down.

Durability in midsoles is desirable since losing the cushioning properties, as happens as traditional midsole materials compact, can lead to injury. Many athletic shoes address this need by introducing some type of hybrid midsoles that integrate pressurized air, or liquid systems that do not lose their cushioning characteristics over time.

FOOTBEDS:

Useful Bottom Component For High Quality Footwear

ABSTRACT

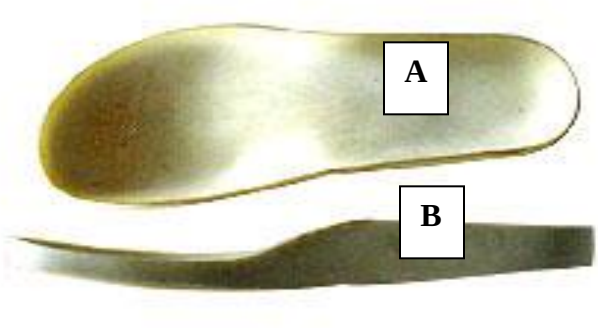
A Normal Footwear Lasts on Insole with/without midsole layer inserted, between it & an essential Outsole.

In Foot-Bed facilitated shoes, the Upper rather lasts directly on highly Flexible, Comfortable & Cushion able Cork/ P.U. thick layer (i.e. FOOTBED) & then is attached a thin Outsole (See DESIGN)

This Practice excludes the need of Comparatively Rigid & Inflexible routine Insole/Runner & Separate Midsole Layer.

A foot bed is essentially made of all natural, resilient materials that cushion your foot and mold to it. The combination of natural latex and flaked cork in a sufficient *thick layer* is preferred as it gradually adapts to one's unique footprint, personalizing the fit while providing superior support and stability. This breathable material help remove perspiration from feet to keep them cool and comfortable all day long.

The use of molded P.U. as foot bed is also recently growing because of its Lightweight, flexibility, easy availability, material uniformity and 'appealing' surface appearance, though it is not too prespirable.



A TYPICAL FOOTBED

A: TOP VIEW B: SIDE VIEW

*** SOME POPULAR HIGH SELLING PRODUCTS ON 'FOOTBED'

LADIES ' STIRO'

LADIES ' MOZAIC'

LADIES' FISHBY'

MEN'S ' HAVANA'

MEN'S ' CAPSTER'

MEN'S CAPSTER- BLK

A foot bed can also be inserted as a covering material for all types of shoes conventionally cement lasted (i.e. on insoles.) These anatomically formed highly flexible thin cork-layers / P.U. molded units give you comfort and health even in shoes with high heels.

These are practically much more better than the normal traditional padded lining material peoples commonly use as in socks. Rather A superior foot bed unit can be inserted either directly, or on above the previously provided in sock layer

(Provided it may not disturb the Fitting.)

Use of Foot bed for sport, work or street shoes makes sure one to have utmost comfort known. A Foot bed always has a positive effect on one's physical fitness and well being.

Its usage bears the following advantages-

Smaller than usual heavy-Padded in socks, it takes less room in the shoe.

- Perfect fit in three widths (fittings) of shoe.
- Exclusively manufactured of natural materials, for a healthy foot climate
- Suitable for all shoes, perfect fit in ski boots and other sport shoes
- Helps avoid problems with your back and averts negative effects on your posture due to proper weight distribution.
- Holds the foot in its natural anatomical form.
- Protects the seams of the shoe's edges through its bowled form.

Foot beds Are Important

Buying a shoe without a custom foot bed is a bit like purchasing a luxury car that has been fitted with ordinary economy car seats. It's true enough that every shoe and boot comes with its own

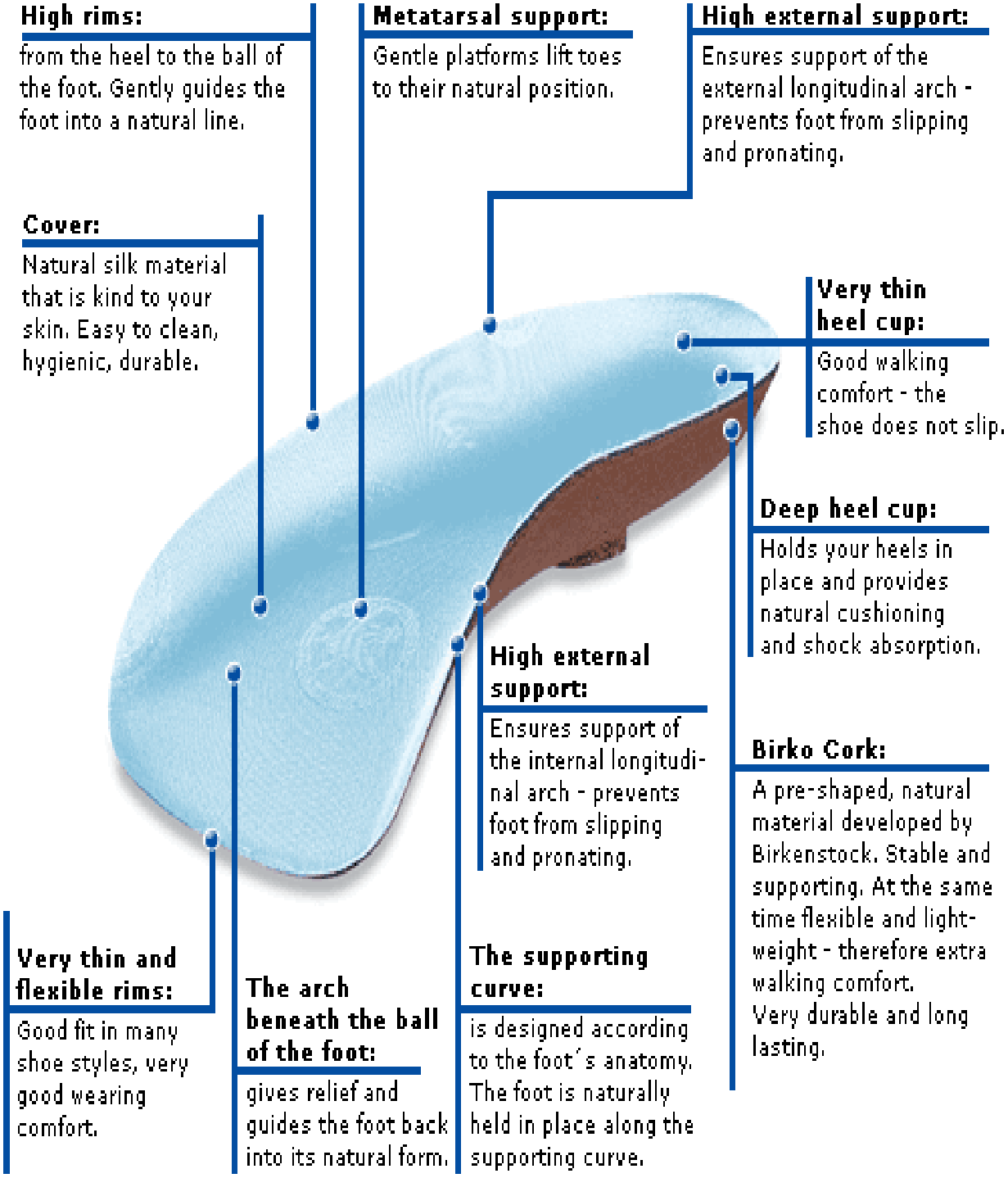
built-in Insock, but as per population overview, these are simply observed to inexpensively offer a "new car feel" and are more fillers than functional parts of the shoe.

Then why don't boot manufacturers who offer a very high brand pricing also even don't put higher quality foot beds in their boots? Cost is one factor, but fit & comfort are the main overriding concerns. Consider that the foot consists of 26 bones and 109 ligaments and that the multitude of foot shapes, contours and curves as well as an individual's body support needs and requirements vary widely. The best manufacturers in hope that with an insole (covered with normal insock), they can ensure of desired delivery of foot comfort and universal fit; need to rethink out of the box.

That is where the custom foot bed roles come in. It definitely serves the need of a User to customize the fit of the boot, give it a more personal feel and puts the foot in the right places inside the boot and keeps it there. In other words the footbed is an integral part of the boot's fit and performance--essential gear, if you will.

Still think that a footbed is not important? Then ponder this: -

"According to the Michigan Podiatric Medical Association, the average person will walk 115,000 miles in their lifetime and that they will take between 8,000 and 10,000 steps every day. Each step exerts a pressure as much as three to four times a person's body weight on the feet--more with a backpack on. An average day of walking brings a force equal to several tons to bear on the feet. No wonder your "dogs" are tired after a long day in the woods."


High rims:
from the heel to the ball of the foot. Gently guides the foot into a natural line.
Metatarsal support:
Gentle platforms lift toes to their natural position.
High external support:
Ensures support of the external longitudinal arch - prevents foot from slipping and pronating.
Cover:
Natural silk material that is kind to your skin. Easy to clean, hygienic, durable.
Very thin heel cup:
Good walking comfort - the shoe does not slip.
Deep heel cup:
Holds your heels in place and provides natural cushioning and shock absorption.
High external support:
Ensures support of the internal longitudinal arch - prevents foot from slipping and pronating.
Birko Cork:
A pre-shaped, natural material developed by Birkenstock. Stable and supporting. At the same time flexible and light-weight - therefore extra walking comfort. Very durable and long lasting.
Very thin and flexible rims:
Good fit in many shoe styles, very good wearing comfort.
The arch beneath the ball of the foot:
gives relief and guides the foot back into its natural form.
The supporting curve:
is designed according to the foot´s anatomy. The foot is naturally held in place along the supporting curve.

SOLING MATERIALS:

NATURAL SOLING MATERIAL

Leather: The use of Leather as soling material is now days forbidden as compared to the blend and choices of desirable properties available with various polymeric compounds. Only in export footwear as Goodyear welted and some high class men's footwear it is preferred, normally its place taken by recently developed & modified synthetic soling materials.

Leather used soling is buff leather and varies thickness from 4mm-7mm.It could be either Indian buff or Argentinean buff leather and is available as in kg. weight unit.

Natural Rubber: Rubber is an elastic substance, with unique combination of properties and is product of certain of certain species of trees of the order Euphorbiaceous of which Hevea Brasiliensis is the most important. This tree is indigenous to Brazil.

Until unless the discovery of Vulcanization, rubber was not recognized as a commercially useful product due to its excess stickiness, which become even stickier when heated. In 1842 Charles Goodyear in America and Thomas Hancock in England made the discovery that if rubber was heated with a proportion of sulphur, the rubber gradually lost its stickiness, while retaining its other valuable properties.(Process of vulcanization).After this discovery , it resulted in very rapid growth of rubber usage in various industries including of tyre & footwear

SYNTHETIC SOLING MATERIAL:

PVC (Poly Vinyl Chloride): It is identified as a potentially suitable material for shoe soling since as long ago as 1938. By 1945, shoes soled with PVC were in commercial production in USA. By 1960, however, it became widely popular.

Although its some properties are still left much to be as desired; but its cheapness & ease of processing are still amongst the main attractions. With recent researches, many of its disadvantages have been overcome, so that today it competes well with other more modern materials such as TR & EVA as well with traditional materials like Crepe.

The gas ETHENE is a by-product obtained by the '*cracking*' of petroleum oil. When ethane is heated under pressure with chlorine gas at 350-450° c, vinyl chloride is produced along with hydrogen chloride gas. At room temp. & atmospheric pressure, the obtained vinyl chloride is a colorless gas and PVC is made by Polymerisation of the Vinyl Chloride.

The monomer vinyl chloride under a pressure of 6 atm is mixed with small quantity of polymerization initiator. Stabilizer (1 %) & water is added and the mixture is heated at 80 c and vigorously stirred. After about 15 hrs of heating 90% the monomer has been converted to polymer. The solid PVC particles are left suspended in water. These are then filtered off & dried in a rotator dryer.

Physically it is non-crystalline and at ordinary temperature is very hard & brittle. Clearly it cannot be used directly in this form for footwear, but must be suitably modified by compounding to make it softer & more flexible. It is thermoplastic with melting temp. 212° c. After compounding, this temp is reduced.

Poly (Ethylene Vinyl Acetate): Poly (Ethylene vinyl acetate), otherwise known as EVA, is a random co polymer of ethene and vinyl acetate monomer. Its pure form is soft

plastic material whose long chain molecules are capable of crystallization to a quite high degree.

For use in footwear EVA resins with vinyl chloride content of 15-28% are preferred. Flexibility, resilience (springiness) and toughness all increases with vinyl chloride content.

Uses of EVA: Microcellular EVA is suitable for men, women and infants' casual everyday and leisure footwear. It is not recommended for any industrial applications, sports, jogging, squash, tennis golf, football, skiing, or boys' everyday shoes which are subjected to severe treatment.

Thermoplastic rubber: TR is a 3- block copolymer. Each molecule consists of soft rubbery blocks of Butadiene monomer unit with a hard block of styrene unit at each ends. It consists of a 2-Phase system which behaves as a rubber till the styrene content is below 40%.Soft polybutadiene chain section gives the rubbery characteristic and Hard polystyrene chain section acts as the reversible cross-links.

Thermoplastic rubbers are relatively new group of elastomers whose main feature is that they do not need vulcanizing to be strong & elastic. This is because they already contain Cross-links. These links are Physical rather than chemical however, and are thermally reversible. This means that they can be broken by heat but will reform on cooling, thus allowing the rubber to be melted and molded under pressure like a conventional thermoplastic material. On cooling the process is reversed and the Cross-linking effect is restored.

Resin-Rubber: In recent years, shoe soles of a type which has now come to be 'Resin-rubber' have become very popular, especially for ladies and children footwear because of its hard wearing properties. This product was first of all launched in market under the name of 'Neolite'.

It is a synthetic rubber with high styrene content (styrene – butadiene ratio of 70: 30).Resembling sole leather in general appearance, it has the following characteristics-

- Hard wearing
- Waterproof

- Easily processed
- Readily stuck, sewn or nail-in

The main defects of resin rubber are- tendency to spread in wear, giving a cold feel in wear, complete impermeability and difficulty in finishing.

Microcellular Rubber (MCR): It is made by addition of suitable Blowing Agent (3.5%) which at the temp. of vulcanization decomposes and produces extremely small pores to produce the sponge effect. Recently this type of soling material is getting popularity in the market, as the produced soling material gets very light in weight and can be produced in almost any color just as in case with normal vulcanized rubber. Suitable blowing agents are Vulcacel BN, Celogen & profor BSH

TPU (Thermo Plastic Urethane): TPU are recently widely recognized as soling material in market segments where durability and abrasion resistance combines with hydrolysis resistance and great flex life. Its excellent cut resistance & low temperature performance makes it ideal for ski boots also. Other core applications such as climbing and hiking boots & safety boots benefit from TPU's long life and wear resistance.

Most recently, TPU have also been used in production of thin unit soles and very high quality unit soles, but wider use of these materials have been restricted because TPU is seen as too hard, too heavy and too expensive.

The challenge to help change this situation was accepted by Huntsman Polymers whose plans are to develop softer, lighter and cost effective TPU.

Earlier the softest TPU available in market was developed at hardness of 70 Shore (which makes sole too heavy), but huntsmen have researched to develop TPU of 50 shore hardness, without the loss of the qualities of the material and achieving the same wear appearance.

The result of this programmed has resulted in the development of a new softer, lighter TPU—Avalon lite—whose properties of the abrasion resistance and excellent flex life are unaffected. Hardness has been reduced to 55 Shore, achieving a 40 % weight loss.

Avalon Lite promises to deliver excellent wear performance, outstanding flex résistance, light weight, hydrolysis résistance, foot comfort and high surface definition.

Self-Check 4	**Written Test**

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 15)**

True and false: (Marks 5)

	True	False
1. Natural rubber is a synthetic material	…….	……..
2. Leather it's come under fibrous group	…….	……
3. Bottom leather is sold by the square decimeter	……..	…….
4. The stiffener is the rigid component of the back of the shoe	……	……
5. Neolite is the trade name of P.V.C.	…….	…….

Short answer questions **(Marks 5*2=10)**

6. Write about resin rubber sole?

7. Write about properties of insole board?

8. Describe about use of leather board in footwear industry?

9. Why foot bed is important? Describe it.

10. Describe the use of bottom filler during shoe manufacturing?

Information Sheet 5- Preparing leather sole.

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Information Sheet 6- Preparing and attaching heels to the leather sole

Insole: insole is the inner sole of the shoe which is next to the foot under the shoe sock. It is

component usually multilayer (removable or not) covering the insole to improve the

performance of the
bottom assembly. Insole may be made all in the piece or, alternatively, in two pieces. When an
insole is made from two pieces it is known as a blended insole.

- I. **Types of insole**

  There are various types of insoles based on their construction.

  ¬ Continental insole

  ¬ Blended insole

  ¬ Half insole: backer board with steel shank

  ¬ Sandwiched insole: half insole of backer board and insole board sand witched together

  ¬ poly propylene injected insole

  II. **Sequence of insole preparations**

  A. **Continental insole**

  1) Cutting of shank board.
  2) Cutting of Insole board.
  3) Stamping.
  4) Grooving of shank board
  5) Matrix skiving of shank board.
  6) Riveting/Attaching of steel shank on shank board
  7) Cementing
  (a) Plain roller for Insole board.
  (b) Flexible roller for shank board.
  8) Attaching of Insole Board and Shank Board
  9) Moulding.
  10) Beveling.
  11) Final Checking and packing.

B. **Blended insole**

1. Cutting of shank board.
2. Cutting of Insole board.
3. Stamping.
4. Grooving of shank board.
5. Matrix skiving of shank board.
6. Skiving of Insole board. [Underlay skiving minimum 20mm.]
7. Riveting/Attaching of steel shank on shank board.
8. Adhesive application on fore part insole board and shank board.
9. Attaching of forepart Insole board and shank board.
10. Moulding.
11. Beveling.
12. Final Checking and packing.

C. **Half insole**

1. Cutting of shank board.
2. Stamping.
3. Grooving of shank board.
4. Matrix skiving of shank board.
5. Riveting / Attaching of steel shank on shank board
6. Moulding.
7. Beveling.
8. Final checking and packing.

D. **Sand witched insole**

1. Cutting of shank board.
2. Cutting of Insole board.
3. Stamping.
4. Grooving of shank board
5. Matrix Skiving of Shank board.
6. Skiving of Insole Board

7. Riveting/Attaching of steel shank on shank board.

8. Cementing a) Plain roller for Insole board

b) Flexible roller for shank board.

9. Attaching of Insole board and shank board

10. Moulding.

11. Beveling.

12. Final Checking and packing.

E. **Poly propylene injected insole**

RIBBED

INSOLE

SKELETON

Eye-lets

. Visible eye-lets

. Invisible eye-lets

D-rings

Hooks

Laces

Nails & Tacks

There are many types of nails and tacks used in the manufacture of shoes designed to suit

numerous lasting and assembling operations. Machine tacks with special finishes to enable

trouble free running in machines are produced in various lengths to suit the material being used.

. Hand lasting tacks

. Machine nails

. Heel attaching nails

. Staples

Toe-puff

It is a reinforcement used to retain the original contour of the toe part of the shoe. The function
of the toe puff is basically to provide shape to the forepart of the shoe, and in industrial boots to
give protection to the foot of the wearer. It is the mean by which the shape of the last forepart is
reproduced in the finished shoe, and thus plays an important part in the appearance and the
general performance of the majority of the footwear types. The choice of the toe puff for any
given footwear type is influenced by many factors such as last shape, upper material type,
production methods to be used, fashion and the views of industrial customers. The basic types of
toe puff used in footwear industries are as follows.

1.14.1. **Solvent activated toe-puff**

It is a type of toe-puff which is activated/become ease for use when dipped in the solvent dip
such as MEK and etc. These toe puffs are impregnated with either nitrocellulose or polystyrene
resin. The solvent blend should contain toluene, which dissolves readily with the resin.

. **Thermoplastic toe-puff(heat activated)**

It is a type of toe-puff which is activated/become ease for use when heated.. **pre moulded steel and plastic toe-puff**

It a type of toe-puff used for safety purpose.

. **Paint-on toe-puff**

. **Filmic toe-puff**

Textile (impregnated fabrics)

The fabric used to make this type of toe puffs are woven, non woven, needle punched and
stitched- bounded. These types of toe puffs are in two forms or types.

- **Thermoplastic type**: is which can be softened by heat and rendered sufficiently
extensible and malleable to accept pulling over the lasting operations.
- **Solvent activated type**: in which the toe puff is rendered soft and extensible in the
factory by being treated with the solvent dipping or conditioning machine, again to make
it receptive to shoe making operations.

Counter stiffener materials

Counter stiffener materials are support to give stiffness, inserted between the lining & upper over
the heel area. Stiffeners are stiff materials similar to that of toe puff which may be moulded to
the shape of the last back part or, alternatively, inserted flat and moulded during the subsequent
process. It is normally inserted between the lining and the upper to support the back part of the
shoe and grip the foot. Apart from the materials used which are similar to that used for toe puff
except for the thickness, leather board can be used. There are three types of stiffener:

- Flat stiffener
- Semi-moulded stiffener
- Fully-moulded stiffener

Stiffener can be:

- Solvent dipped

- Thermal activated
- Pre molded leather board

A. Characteristics of material

Leather

Line of stretch and tightness

The direction of lines of tightness and lines of stretch play a major role in cutting of pattern from
hide or skin.

Lines of tightness are defined as the direction in which the material does not extend in length or
very little increment in length takes place on applying force by two thumbs.

Lines of stretch are defined as the direction in which the material is increased in length or
stretches more by applying the same amount of pulling force.

Normally, the line of tightness is just at 90° to the lines of stretch.

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The diagrams shown below illustrate lines of tightness and lines of stretch on a hide/side.

Line of tightness Line of stretch

These lines are important in cutting because the upper component must be cut in such a way that the lines
of tightness cut along the length of the shoe for proper shape retention in other words, we say that the
component are cut “tight to toe”. This rule is strictly adhered to in cutting most types of footwear. It is
disregarded only in special circumstances e.g. open toe sandal, boots etc.

. Grain structure

. Size

. Nap

. Substance

Properties of leather

Properties of adhesives

Properties of soling mater

Properties of textile materials

. Properties of toe-puff and counter stiffeners

. Generic and trade names of

. Leather

. Toe-puff and counter stiffener materials

Textile

. Adhesives

. Soles

. The Uses of Footwear Material for Footwear Production

. Uses of footwear materials

. Leather

Upper

lining

socks

Textile

Upper. Lining. Socks

. Inter-lining. Re-enforcement **Adhesives**. Lining pasting. Foam attaching. Sole attaching. Inter-lining attaching

Toe-lasting

Polyester adhesive is used for toe lasting operation in shoe industry

Seat & side lasting

Polyamide adhesive is used for seat and side lasting operation in shoe

industry.. Tacks & nails. Hand lasting

Heel nailing/ buttress nails. Machine nails

Ultra-sonic staples. Insole staples

Rivets

Shank board. Steel shank

⎫ Shank is used to stiffen or to prevent excessive bending of the plantar arch**.**

⎫ In providing essential support for the arch of the shoe, it withstands heavy bending and

torsional stresses whilst maintaining accurate alignment of forepart and heel throughout all

the stresses of the shoe's life. A shank is probably the most severely stressed component in a

shoe.**. Eye-lets. Insole board**

⎫ Insole board is used to improve the performance of the bottom assembly.

⎫ Insole is used for maintaining the upper shape of the shoe form deformation.

⎫ Enables lasting operation is to be carried out.

⎫ Used for maintaining flexibility of the shoe and for supporting the sole**. Laces.**

Toe-puff & Counter stiffeners

Toe puff is used for:

⎫ Used to retain the original contour of the toe part of the shoe.

⎫ Used to provide shape to the forepart of the shoe, and in industrial boots to give

protection to the foot of the wearer.

Counter stiffener is used for:

⎫ Counter stiffener materials are support to give stiffness, inserted between the lining &

upper over the heel area.

) Used to maintain the shape of the back part of the shoe or to support the back part of the

shoe and grip the foot.**. Finishing materials**. Finishing Creams. Repairing waxes

Carnauba wax. Abrasive wax. Water based sprays & Cleaners. Solvent based spray and cleaners**. Chemicals**. Toluene

Methyl Ethyl Ketone ,,,,, pvc. Ethyl Acetate. TPR primer----cleaner

B. Handling and care requirements for materials

- Leather
- Adhesives
- Finishing Material
- Chemicals

C. Common problems and faults are identified

- Leather
- Adhesives
- Soling material
- TPR primer
- Finishing materials

D. OHS practices relevant to materials uses are identified

- Adhesives
- Primers
- Finishing materials

3. Performance of materials for footwear

3.1Physical properties of footwear material

Leather

Adhesives

Re-enforcements

Textile

Steel Shank

Soling material

Performance characteristics of footwear material

- Shape loss
- Problem in walking
- Foot Injury
- Pain in feet

3.3Types of surfaces finishes used on leather materials

- Velvety
- Glazed
- Oily
- Patent
- Crimpled
- Embossed
- Smooth
- Film coated
- Fur leather

4. Identifying Common faults, problems and surface defects of footwear materials

4.1. Identification of common faults, problems and surface defects of leather

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.

Defects that can be found in the finished leather can be classified into two basic groups. These

are natural and man made defects. Some of the natural defects are vein marks, growth marks,

tick marks, warble-fly marks and etc. while man made defects are brand marks, barbed wire

marks, flay cuts, flesh cuts and etc.

From these defects, mostly the man- made defects affects the quality and cutting value of the

bottom leathers. Some of the common leather defects are listed below:

- **Looseness**

Fig. loose flanks

Fig. Loose Fibers

- **Thickness**
- **Pipeness**
- **Scratch marks**

Fig. Scratches or Blemishes in the Grain

- **Scar marks**
- **Brand marks**

Fig. Brand Marks in Butts

- **Flay cuts**
- **Cracking**
- **Bleeding**
- **Tearing**
- **Grain cracking**
- **Flesh cuts**
- **Warble hole**

[

- **Tick mark**
- **Growth marks**

Fig. Growth Marks in the Neck

- **Vein marks**

- **Heavy break**
- **Coarse finish**
- **Warble and Tick Marks**

4.2. Describing possible cause of problem, causes and surface defects of leather

- **Looseness**

Looseness of the leather is happen due to poor fiber compactness in some parts of the skin or
hide. It is mostly occurs in the belly and offal areas of skin/hide.

- **Thickness**

Thickness of the leather is happen when the skin is below the expected thickness**.**

- **Pipeness**
- **Scratch marks**

Scratch marks are such as barbed wire marks which are a very common form of marks and
damages to the skin, made when the animal tries to creep through barbed-wire fences in to the
grazing fields etc. Often found the sides, caucus deep cut, resulting in damage skin and the
resulting leather.

- **Scar marks**
- **Brand marks**

These are identification marks made on the skin of the animal, by the owner, using hot branding
irons, which causes deep marks, resulting in damage to the skin or hide and the resulting finished
leather. Normally the brand marks are inserted in the butt area which is the area with the best

leather.

- **Flesh cuts**

It is the removal of the excess flesh from the skin or hide preparing it for the tanning process and
this operation is carried out by hand or by machine.
Especially during hand flashing, some times deep cuts are made on the skin or hide, due to the
careless handling of the knife by the flashing operator.
They are also similar to flay cuts and should be inspected carefully from both the grain side and
the flesh side of the finished leather before cutting.

- **Flay cuts**

These operation by which the skin or hide is removed from the carcus of the animal, is referred
to as flaying. During the flaying operation, due to bad handling of the knife, sometimes deep
knife cuts are made into the skin or hide, resulting in damage.
As these flay cuts are taken from the flesh side, of the skin or hide, they are not so visible from
the grain side of the finished leather. Therefore, when cutting bottom leather he grain side as well
as the flesh side should be carefully inspected for such deep cuts.

- **Cracking**
- **Bleeding**
- **Tearing**
- **Grain cracking**
- **Warble hole**
- **Tick mark**
- **Growth marks**

- **Vein marks**

4.3. Work place quality practices relating to the faults, problems and surface defects

- **Looseness**
- **Thickness**
- **Pipeness**
- **Scratch marks**
- **Scar marks**
- **Brand marks**
- **Flay cuts**
- **Cracking**
- **Bleeding**
- **Tearing**
- **Grain cracking**
- **Warble hole**
- **Tick mark**
- **Growth marks**
- **Vein marks**

Information Sheet 6- Cleaning and maintaining work area

How clean is your workplace?

Employers are - as we all know - obliged by law to provide certain standards of cleanliness and comfort in the workplace. But this doesn't of course mean that every office or shop has to have shiny windows and brand new coat of paint every month. It's all about health and safety.

You might also, by contrast, have visited work premises that really impress. There doesn't need to be a marble staircase and a glass roof – just the sense of things being looked after and that some thought's gone into the working environment. If a company offices look well maintained, clean and professional the effect is more than cosmetic: it projects the right image, and in turn is likely to raise staff morale and potentially help maximize productivity.

And while the maintenance of the building and the cleanliness levels are the responsibility of management, it's still a team effort. From operating a 'clear desk' policy to having clear rules about where you are working,

General Guidelines

1. A Safe and Healthful Workplace

2. Effective Communication

1. Safe and Healthful Workplace

Support from top management and employees are critical for a safer workplace. It is essential to:

- Look carefully at the work environment to identify problems and potential risks.
- Get ideas from employees on reducing or eliminating risks.
- Take corrective actions. Be sure to follow up.
- Let workers know that safety rules protect their health and ability to make an income.
- Instruct workers they are expected to use safe work practices.
- Lead by example and show your commitment to health and safety at your job.
- Encourage employees to report hazardous conditions.
- Respond promptly to workers' concerns.
- Negotiate changes with building owners, if necessary.
- Provide personal protective equipment (PPE)

Make sure enough PPE is available.

Encourage communication and sharing of ideas.

2. Effective Communication:

It is important to:

- Suggest ways to help cut costs and improve productivity.
- Develop ideas to help solve workplace health and safety problems.
- Produce higher-quality work.
- Meet with staff regularly to talk through issues clearly and resolve problems.
- Communicate in a language that employees understand.
- Establish an open-door policy to discuss any problems employees may have.
- Understand different cultures and customs.
- Explain the reason for some decisions so workers walk away feeling their concerns were heard.
- Make staff feel comfortable about going to you for help.

- Make employees feel part of a team to further enhance teamwork, greater productivity, and employee satisfaction.
- Make employees feel valued and show appreciation for their work.
- Provide a secure method of communication (for example, a suggestion box). Employees can report anonymously their concerns or issues.

Use employees' ideas to resolve problems

Self-Check 5	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 4)**

(Each question has 2 marks)

01. Give two points for safe workplace in organization

02. Give two points for effective communication.

LG #38	LO3. . Assess final quality of the bottom components and dispatch

learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying critical stages of the inspections.
- Performing quality checks in relation to the design of footwear and last.

- Identifying and analyzing problems and faults.
- Maintaining report and record
- Dispatch completed work

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Critical stages of the inspections are identified.
- Quality checks in relation to the design of footwear & last is performed.
  - Identify and analyzing problems and faults.
  - Report & record is maintained is communicated & maintained
  - Identify Dispatch completed work

Learning Activities

17) Read the specific objectives of this Learning Guide.

18) Read the information written in the “Information Sheets 1”.

19) Accomplish the “Self-check 1” in page 14. Request the key answer / key to correction from your teacher or you can request your teacher to check it for you.

20) If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.

21) Submit your accomplished Self-check. This will form part of your training portfolio.

22) Read the information written in the “Information Sheet 2”.

23) Accomplish the “Self-check 2” in page 20. Again you can request the key answer / key to correction from your teacher or you can request your teacher to check it for you.

24) If you earned a satisfactory evaluation proceed to next learning guide. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #6.

Information Sheet 1 Critical stages of the inspections are identified

Critical stages of inspection in process of manufacturing

4.1.1 Insole

- **Direction of cutting:**

Cutting the Insole board or shank board. We must follow the cutting direction. Insole board there are arrow marks given on sheet and those are along the length of the sheet. Because it's clear that along the length Flexibility is always more.

Inspection in process of manufacturing Insole-

- Insole should be full to pattern.
- Insole should be cut 1 pair at a time when using cold bend knives. 32 mm single edge.
- Cut according to direction marked on insole board as above.

- Cut 1 pair or 2 pair at a time.
- 19 mm die- 1 pair
- 32 mm die- 2 pairs
- Forged knife – 3-4 pairs

➢ **Size stamping:**

Inspection in process of manufacturing Insole-

- Check insoles on pattern before size stamping.
- Stamp is clearly readable.
- Stamped to customers specifications
- Use rubber pad inside the die for ejection of shank board.

After cutting the insole and shank board we will make the LOT of 20 or 25 pairs and put the master pattern over it, so that master pattern can fit with the full lot and we can start stamping.

➢ **Shank board skiving:**

Inspection in process of manufacturing Insole-

- The matrix skiving is done on the forepart of the shank board.
- Matrix skiving is always 25 mm.
- Skiving should be 0 on the edge.
- Set the matrix roller according of shank board substance.

The purpose of skiving is for:-

➢ **Steel shank position:**

Inspection in process of manufacturing Insole-

- Grooving should be centre of the shank board.

- Grooving as per the length of shank.
- According of shank width set the cutter.

The necessity of the grooving is for proper fixing of the metal shank on shank board. When we are doing the grooving care should be taken that the length and the depth of the groove should be according to:-

- Length, width and thickness of the Metal Shank.
- The thickness of the shank board.
- Seat Position

The purpose of grooving is that after shank riveting the level of the shank will match with the level of shank board.

- **Selection of mould:**

Inspection in process of manufacturing Insole-

- Always mold the insole to the shape of the last.
- Make sure there is no wing in the insole when molded.(no gap between last and insole)
- Never over mold insole as this will cause a break down in the materials.
- Check at frequent intervals that moldings correctly done.

Selection of mould should be according to the last bottom profile. For that one odd of each size of the last must be on the molding machine. So that after molding we can check the molding of each size.

The pressure of the machine should be done on 60 to 80 Bar for the soft material. First molding should be done on 60 Bar. If it is satisfactory then go for 80 Bar.

- **Beveling angle:**

Inspection in process of manufacturing Insole-

- Angle of bevel will suit the heel to be used start and finish the bevel at the shank board joint.
- Edge of the insole has a smooth and not rough bevel.
- There is only one beveling angle for a last.

4.1.2 Soles

➢ **Size:**

- Check the cutting die with master pattern.
- Check the quality of sole leather (substance).
- Due to less thickness of material, sole can be rejecting.
- Before start stamping confirm the size of cut sole.
- Set pressure of stamping machine head & temperature.
- Set the guide for maintain the proper place of stamping.

➢ **Edge trimming:**

- Set the edge trimming machine before start working.
- Tin pattern should not flexible & fix tightly in the machine.
- Check cutter (as per the design/required edge of sole)
- After trimming check with out sole pattern.
- During edge pre-trimming care should be taken to avoid burning effect on edges.
- The R.P.M. of the cutter is 9000 to 10000, so the flow of the hand should be continues during operation.
- Edge pre-trimming should be according to specification of customer.

➢ **Rand attachment:**

- Clean the surface of sole (where welt to be attach).
- Clean the welt.
- Apply past on sole & welt uniformity.

- Give proper drying time.
- After attachment of welt with sole press properly.
- Check with inner rand pattern (must be perfect).
- Welt should not open.

➢ **Heel attachment:**

- Roughing 2 mm short from heel marking at seat portion.
- Heel nail or pin should be attached properly.
- Heel height should be same & pair wise in case of leather left & top.
- Top piece design should be pair wise.
- Heel cupping should be fixing with the sole without any cavity.

During heel attachment process heel cupping is a process where special shape is given to heel so that seat of the lasted upper can sit properly on the heel cup to avoid gaping on the edges.

➢ **Heel scouring:**

- Heel scouring is done after heel attaching process. In this process we carefully do scouring without damage the heel.
- Scouring with fine emery paper.
- There is no gap between sole, welt & heel

➢ **Edge Inking:**

- Apply color on the edges (wait for 15 minutes or according to weather).
- Color should be pair wise & match.
- Edge inking we have to do carefully otherwise ink tech to the other part of the sole, & it's not remove because leather absorb the ink.

➢ **Bottom polish:**

Bottom polish is part of finishing process. Here we use the polish according of sole material like in leather sole we use abrasive wax & natural carnuava.

- Abrasive wax application on cotton brush & brushing the edge with R.P.M. 800.

- Natural carnauva application on woolen brush & finishing the sole with the R.P.M. of 1600.
- Bottom polish should be match pair wise.

4.2 Perform quality check in relation to design-

4.2.1 Insole.

- Direction of cutting:
- Checking with master pattern during stamping.
- Shank grooving should be in centre and depth should be according to length, width, thickness of metal shank and shank board.
- Matrix skiving should be 25 mm and 0 skiving on the edge.
- Shank riveting should be according to work detail card.
- Cementing should not exceed the limits.
- Drying time must be proper.
- Attaching must be proper.
- Molding should be according to last bottom profile.
- Beveling angle must match with last and heel.

➢ **Cutting direction:**

Insole board there are arrow marks given on sheet and those are along the length of the sheet. Because it's clear that along the length Flexibility is always more. So when we are cutting the Insole board or shank board. We must follow the cutting direction.

When we are following the direction cutting there is too much wastage of the material, in that case we can avoid the wastage by cutting small size like 3,4,5,6 across the direction. The reason of cutting of these sizes, because the person having those sizes have got less body weight. So that material can retain its value and quality.

Note : Because the material is very costly we cannot avoid the across cutting but only in small size.

- **Size stamping:**

After cutting the insole and shank board we will make the LOT of 20 or 25 pairs and put the master pattern over it, so that master pattern can fit with the full lot and we can start stamping as required because we will have to fit:-

- Correct size of shank.
- Distance from seat portion.
- Attaching of shank board.

Shank attachment:

Shank Riveting:- The purpose of the shank riveting is:

- During walking shank will not lose its place.
- And properly stick with the shank board.
- Shank is attached at the correct distance from the seat edge.
- Shank is attached in the correct line of the shank board.
- The correct steel shank is fitted to suit the height of heel being used.
- That the rivets or eyelets are clinched this will hold the shank in place.

Shank riveting should be according to work detail card. In work detail card the seat position is mentioned for the given size range.

Note: The length and the width of rivet must be according to thickness of the metal shank, shank board and the diameter of the hole.

- **Cementing:-**

Cementing should not come either on the reverse side of the component as well as not exceed the limit.

Note: Care should be taken to avoid the adhesive to go on the reverse side through rivets hole.

- **Drying:-** Drying time must be according to:-
  - Time and method given by supplier
  - Condition of weather and (Temperature and Humidity)
  - Standard

Note: Dust should not come in contact of the adhesive.

- **Attaching:-**

During attaching the shank board with the insole care must be taken that shank board should fixed exactly over the edge of insole.

Note: If the edge will not proper we cannot get the proper beveling angle, and one operation will be increased (buffing).

- **Insole molding:**

Selection of mould should be according to the last bottom profile. For that one odd of each size of the last must be on the molding machine. So that after molding we can check the molding of each size.

The pressure of the machine should be done on 60 to 80 Bar for the soft material. First molding should be done on 60 Bar. If it is satisfactory then go for 80 Bar.

Note : The pressure 60 bar to 80 bar is for soft and thin material but for hard and thick material like, 2.5 mm or 3 mm, the pressure will be 80 to 90 bar.

- **Insole beveling:**

Beveling angle is unique for a given last.

Note: Beveling angle should be checked with particular last for the checking of the angle for all insoles only one odd of last is sufficient.

4.2.2 Sole quality check in relation to design.

Before edge trimming quality should be checked on this process -

- **Thickness of sole:** Thickness of sole is very important and referred by customer. If the requirement of thickness is 4.5 mm, we will cut leather out of 4.75 or 5mm thick leather. In that case splitting is not required & directly we can go for leveling & roughing.
    - If the sole is natural bottom, thickness should be 4.5 mm after leveling & roughing.
    - If the sole is colored bottom, thickness should be 4.6 or 4.7 mm after leveling & roughing, because material will remove during snuffing.

  Leveling & Roughing: This is the process to make sole thickness even so that it will sit properly in to the groove of the cutter & raise the fibers for deeper penetration of adhesive during sole pressing.

  Note: Do not accept the loose fibers during leveling & roughing, suppose the required thickness is 4.5 mm, & after getting leveled & roughed to this thickness the fibers are still loose, in that case we can remove the fibers up to 4.3 mm for getting tight structure. (2 mm is acceptable)

- **Trimmed edge:** During edge pre-trimming care should be taken to avoid burning effect on edges. There are different types of edge pre-trimming cutter round straight, half round or grooved. Edge pre-trimming should be according to specification of customer.

  Note: because the R.P.M of the cutter is 9000 to 10000, so the flow of the hand should be continues during operation.

    - After trimming sole should be match with pattern.
    - No burning effect on edges.
    - Sole edge should be according of design.

- **Track roughing:** Track roughing is a process on the edges of flesh side of the sole (except welted) to remove the filters in certain width & depth (according to specification & type of sole) so that lasted upper can sit properly in to the track.

Note: There should be some thickness on the track. Suppose the thickness of the sole is 4.5 mm so during track roughing will be reduced on the edges comparison to going more and more inside.

- **Size stamping:**
  - Check sole pattern before size stamping.
  - Check pressure of stamping machine head & temperature.
  - Check the guide for maintains the proper place of stamping.
  - Stamp is clearly readable.
  - Stamped to customers specifications
- **Logo quality:**
  - Check the guide for maintains the proper place of logo.
  - Logo design should be is clearly visible.
  - Logo as per customer's specifications.
- **Heel cupping:**

Heel cupping is a process where special shape is given to heel so that seat of the lasted upper can sit properly on the heel cup to avoid gaping on the edges.

Note: Mesonite heels are heavy, so we can do some drilling in the center of the heel for reducing the weight.

During drilling care should be taken that, the depth of the hole should be according to the height of the heel. Suppose there are four heel lifts & one rubber top piece, in that case drilling should be up to third lift.

- **Rand attachment:**
  - Welt should be attached properly with sole.

- No cavity between welt & sole.

➢ **Heel scouring:**

Heel scouring is done after heel attaching process. In this process we carefully do scouring without damage the heel.

➢ **Finishing process:**

Edge Inking & Bottom polish:

This is the main process of the sole making. If finishing will be wrong, the earlier process will be waste.

- After heel attaching buff with 36 no. emery.
- Apply water on the edges.
- Buff with 180 no. emery paper.
- Apply filler (and wait for 5 minutes).
- Buff with 200 no. emery paper.
- Apply colour on the edges (wait for 15 minutes or according to weather).
- Abrasive wax application on cotton brush & brushing the edge with R.P.M. 800.
- Natural carnauva application on woolen brush & finishing the sole with the R.P.M. of 1600.

Bottom polish is part of finishing process. Here we use the polish according of sole material like in leather sole we use abrasive wax & natural carnuava.

Self-Check 1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 16)**

Choose the correct answer :(Each question 1 mark) (Total marks 4)

01. Matrix skiving should be
    (i) 30 mm
    (ii) 20 mm
    (iii) 25 mm
    (iv) None of them
02. Mould selection is depend on
    (i) Sole
    (ii) Last
    (iii) Insole
    (iv) None of them
03. Half insole is use for
    (i) Goodyear welted
    (ii) Moccasin shoe
    (iii) Stitch down shoe
    (iv) moulded shoe
04. Natural carnauva finishing is done by
    (i) Cotton brush

(ii) Woolen brush

(iii) Synthetic brush

(iv) None of them

Short answer questions: (Each question has 2 marks) (Total marks 12)

05. What precaution should be taken before size stamping?
06. What is a criteria of selection of mould?
07. Write about direction of cutting?
08. Write two points for edge trimming?
09. Write about quality check point of shank attachment?
10. Write Two quality check points of insole?

Information Sheet-2	**- Performing quality checks in relation to the design of footwear and last.**

Sole protectors: pros, cons, and how to glue your own

while i love how leather soles look, and how they feel under my feet as i walk, i hate that after a few months, they start to look beat up… anything from basic scuffs to uneven heel wear and tear.

Not to mention, in the winter, it's much easier to slip and slide all over an icy sidewalk in smooth leather soles than grippy rubber ones.

The following is a guest article from Spencer over at Half Soles. I think sole protectors are an interesting option for those who want to extend the life of their soles without applying anything too permanent to their dress shoes or boots

First off, why sole protectors at all?

Leather soles are the standard when it comes to most quality footwear. However, the classic elegance of leather soles is great for indoors, but not always so practical for outdoors.

If you walk much on pavement, you're likely to grind through your leather soles in 4-6 months, like this guy or this guy.

Sole protectors, like Vibram half soles or Topys, are a great option for those **looking to add a bit of durability and grip.**

Let's evaluate the general pros and cons of sole protectors, taking into consideration multiple factors.

The pros and cons of sole protectors

Style

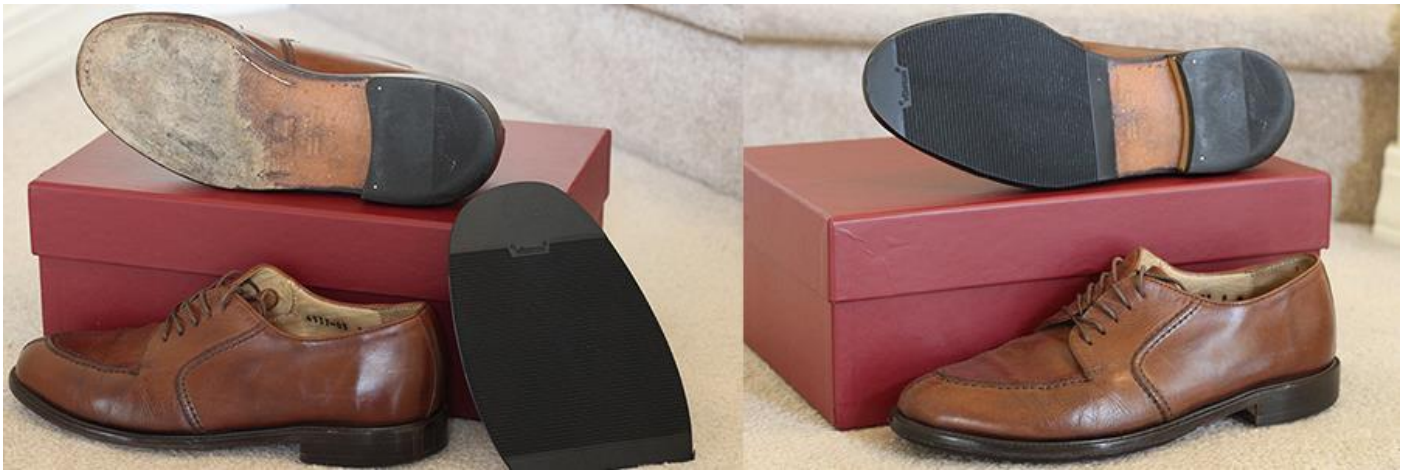
- *Con – Naked leather looks better.*
- *Pro – A commando tread can add a manly touch.*

Some things are better left alone, and beautiful leather soles are apt to feel like one of those things.

Before and after adding half soles to Allen Edmonds Fifth Avenues

Believe me, defiling these beauties with 60 grit sandpaper was not easy. But, I knew they wouldn't look shiny forever.

Sure, they're picturesque when new, but then, they're used. The soles get scuffed and scraped. The stitching gets chewed away.



Here's an older pair that I added half soles to – the style tradeoff isn't quite so bleak when comparing to worn leather soles.

Here's my pair of Wolverine 1000 Mile boots with a lug half sole – personally, I prefer the more rugged look with the half sole.

Comfort

- *Con – A bit heavier and stiffer.*
- *Pro – Preserve your break in.*

Adding half soles and heels to my Allen Edmonds added about 2.5 ounces (70 grams) to each shoe. Adding half soles and heels to my Wolverine boots added about 4 ounces (110 grams) to each boot.

But, I really don't notice the added weight and stiffness when they're on my feet.

On the upside, **preserving the leather soles means preserving the break in.** A resole means a new break in. A new leather sole to flex. A new cork bed to mold.

All of your beautiful break in stays when you peel off your worn half sole and stick on a new one.

Durability

- *Con – None!*
- *Pro – Preserving your sole preserves your entire shoe.*

Even recraftable shoes can only be resoled so many times. A cobbler using a rapid machine for Goodyear welt stitching can do 2-3 resoles before the welt starts to fall apart.

If the manufacturer resoles the shoe, they can do a more complete reconstruction and get 4-6 resoles in before the insole starts to give up.

Sole protectors save your soles, and thus also your welts and general shoe construction. You can peel off the worn half sole and stick on a new one as many times as you'd like.

The half soles on my Wolverines are going on 10 months, with lots of life left in them still.

Grip

- *Con – None (again)!*
- *Pro – Address your needs, from low profile to chunky tread.*

Leather glides nicely along on dance floors and office rooms, **but it's scary on snow and ice.** If you occasionally tear out your crotch on walks to your car, sole protectors might be for you.

I use the Vibram **dress half soles** on my Allen Edmonds. The thin sole and minimalistic tread pattern maintain a more formal profile, but still feel stable on snowy and rainy sidewalks.

I use the Vibram **lug half soles** on my Wolverine 1000 Mile boots. Their grip is more solid for rock, dirt, rain and snow, and the thicker rubber sole adds a nice cushioning. And I love the look of the classic commando tread.

Convenience

- *Con – Working on your own shoes.*
- *Pro – Working on your own shoes.*

Working on your shoes is inconvenient, but so is waiting a week for your shoes from your cobbler.

When my sole protectors have worn through, I peel off the old and slap on the new. It takes me about 20 minutes. It's a forgiving process and easy to do. The glue is dry and ready to run by morning.

Also, don't underestimate the inconvenience of miscommunication.

There are many horror stories of ruined shoes by cobblers who misunderstood their customer's wishes. Language barriers with the guy who's going to cut and stain your shoes can be very inconvenient.

Cost

- *Con – A wash if a cobbler does it for you.*
- *Pro – I do my own. A $10 pair lasts me 12-18 months.*

The cobbler near me wanted $65 to put on half soles and heel lifts, and $90 to do a resole. I'd be better off getting a new pair of shoes from JCPenney every year.

Therefore, I do my own half soles (and will teach you to do the same below). A $10 pair lasts me 12-18 months. The $30 quart can of Barge All Purpose Cement I use is good for 20 to 25 pairs. The glue stores well for extended periods of time, so you don't have to worry about using it all at once.

How to glue your own sole protectors

Alright, we're getting to the nitty gritty. Hopefully I've convinced you to at least give the half soles a try. And if you're on the same page, you're going to want to know how to apply them correctly.

Materials and tools needed

- Half soles
- Sandpaper
- Rubber cement
- String/cord/rope
- Trimming knife

Step 1: prepare the bonding surfaces

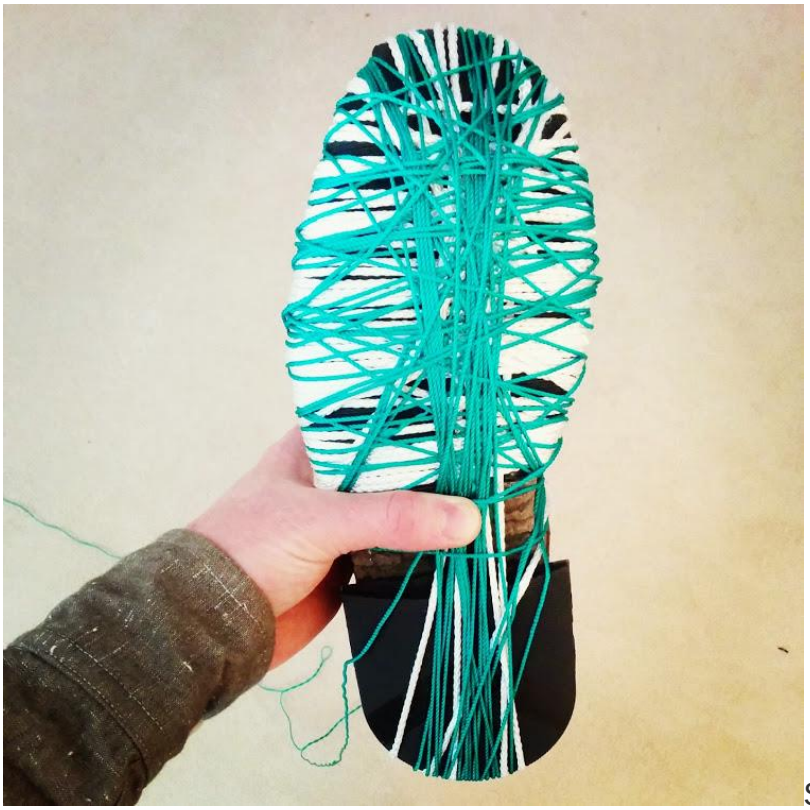
1. Position the half sole as desired. Leave extra on all sides to get a clean trim at step 4.
2. Mark the bottom edge of the half sole onto the sole using a pen. This line will serve as a guide for applying the glue to the sole and for positioning the half sole at step 3.
3. Roughen the bonding surfaces of the sole and the half sole. The glue needs a texture to grab onto. Sixty grit sandpaper worked well for my Allen Edmonds, but not for my Wolverines. Get creative. For my Wolverines the back end of my crescent wrench worked well.
4. Clean the bonding surfaces with a dry cloth.

Step 2: apply the rubber cement

Steps 1 and 2 done.

1. Apply a thin, uniform layer of glue to both bonding surfaces. Cover the surfaces all the way to the edges. I like to go a bit past the marked line to make sure I get a good bond all the way to the bottom edge. The extra glue can be peeled off later.
2. Let the glue dry for 10-15 minutes.
3. Apply a second coat, covering the spots that might be sparse.
4. Let the glue dry for about 20 minutes. You'll know it's ready when the glue is tacky to the touch, but does not come off onto your finger.

Step 3: bond the half sole



Step 3 done on the Allen Edmonds.

1. Carefully position the half sole to the line you marked on the leather sole in step 1.

2. Starting at the marked line, press the half sole onto the sole. Roll the half sole onto the sole from the bottom edge up toward the toe as you go, being careful to not trap any bubbles.

3. Firmly press the half sole onto the sole for a tight bond. Really press it. The center, and all around the perimeter. You can grunt. This is a man's work.

4. Pound the half sole on with a hammer.

5. Tightly wrap the half sole to the sole using a string. Inserting shoe trees helps the shoe keep it's shape, and laying a folded rag on top of the shoe protects the leather and gives the string something to hook onto while wrapping.

6. Let the glue cure for at least 3 hours.

Step 4: trim the half sole

1. Use a smooth, continuous cut to trim around the perimeter of the half sole. Avoid rocking the blade to minimize visible cut lines.
2. Tilt the blade inward as you trim to give the edge a beveled angle for a cleaner look.
3. Let the glue cure for at least 12 hours before wearing.

So, are rubber sole protectors for you?

Well, like anything else you wear, it's a matter of personal preference. There are advantages and disadvantages. You'll just have to decide what you want.

For me, I like the practicality, and I like having a project to work with my hands.

Information Sheet-3	Identifying and analyzing problems and faults.

3 Common faults and problems for different materials

Leather sole

Leather defects that can be found in the finished leather can be classified into two basic groups.

Natural	**man made**
Growth marks	Brand marks
Hick marks	Flay cuts
	Flesh cuts

From these defects, mostly the man-made defects affect the quality and cutting value of the bottom leather and as such, these defects are described below.

BRAND MARKS: These are identification marks made on the skin of the animal, by the owner, using hot branding irons, which causes deep marks, resulting in damage to the skin or hide and resulting finished leather. Normally the brand marks are inserted in the butt area which is the area with the best leather.

FLAY CUTS: These operation by which the skin or hide is removed from the animal, is referred to as flaying. During the flaying operation, due to bad handling of the knife, sometimes deep knife cuts are made into the skin or hide, resulting in damage.

As these cuts are taken from the flesh side, of the skin or hide, they are not so visible from the grain side of the finished leather. Therefore when cutting bottom leather, the grain side as well as the flesh side, should be carefully inspected for such deep cuts.

FLESH CUTS: the removal of the excess flesh (soft tissue) from the skin or hide preparing it for the tanning process is referred to as fleshing and this operation is carried out by hand or by machine.

Specially during hand flashing, sometimes deep cuts are made on the skin or hide, due to the careless handling of the knife by the flashing operator.

They are also similar to flay cuts and should be inspected carefully from the grain side and flesh side of the finished leather, before cutting.

Common problem in leather sole:

13. Leather issued without considering grade.
14. Loss Leather.
15. Brand marks on the finished leather
16. Flay cuts on flash side
17. Flesh cuts on flash side
18. Thickness variation

Defects: Defects of leather include fiber quality, soft spots, brands, cockle, scratches, wrinkles, insect bites, grain damages, grub damage, cuts, skiving defects and fleshiness.

Natural markings: The subtle markings on leather are analogous to finger prints. They distinguish genuine leather from manmade materials. Other marks which can appear on the surface of leather are healed scratches and scars, barbed wire marks, stretch marks, vein marks, wrinkles, brands and insect holes.

Insole board:

15. No uniformity of thickness

16. Creaking due to moisture

17. No flexibility

18. No resistance to shrinkage or growth

19. Dust and dirt on the board

20. No ability to hold tacks adhesives or stitches.

21. More bulky

Factors of deterioration:

Deterioration is a change of original state of any material by interaction between the object and the factors of destruction. The different types of deterioration of the cellulose board materials are reflected in wear and tear, shrinkage, cracks, discoloration, abrasion, hole, dust and dirt etc.

Humidity and Moisture: - Humidity is the amount of moisture in the atmospheric air. The moisture is measured in terms of relative humidity. All organic objects absorbs water to a greater or lower extent and the water goes inside the object through surrounding air. Because of this absorbency property, the fiber board absorbs more moisture when there is high humidity. Certain amount of humidity is necessary for the flexibility of fiber board but in prolonged high humid condition, board becomes wet and the moisture weakens the fibers of board.

Dust and Dirt:- Fine dry particles of any matter present in the air are known as dust. Since dust is air borne it settles down on any surface of the object

HEEL:

m. Not good quality finish.

n. Color not matching.

o. Cracking on attachment.

p. Last bottom profile not match with heel

q. Size not matching

r. **I**nadequate pin holding strength

Toe puff and stiffener sheet

11. No uniformity of thickness.
12. Less tack retention.
13. No ability to survive molding and shape retention.
14. Skiving problem.
15. Coating of adhesive not good.

SHANK

9. Variation of thickness

10. Strength or performance

11. Length & width problem

12. Shank design not match

Self-Check 3	**Written Test**

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 8)**

(Each question has 2 marks)

09. Write about common defects in V.T. leather?
10. What is a factor of deterioration of insole board?
11. Write about problem & faults in leather board?
12. What do you mean by brand marks?

Information Sheet-4	Maintaining report and record

3.6 Routine maintenance of machine

Maintenance Planning

It is providing file information to technicians allowing them to learn from past jobs and avoid delays, also provide crew supervisor with job scopes plus craft and work hours estimates to allow them better to assign working schedule. It is also a major strategy to improve maintenance efficiency with regards to unproductive maintenance time.

Since maintenance planning is a major strategy to improve maintenance efficiency with regards to unproductive maintenance time. So there are also some maintenance strategies to solve these problems, among this:

Corrective Maintenance: work to restore to proper operating condition before failure or breakdown occurs.

Preventive Maintenance: time or interval based maintenance designed to head off defect equipment problem.

Reactive Maintenance: Maintenance work performed as a response to a failure, breakdown, or other urgent equipment situation.

During maintenance planning, the following requirements have to be fulfilled.

Planner (maintenance planner): the person responsible for preparing work orders for execution through applying the principles of maintenance planning, it also supports the function of the plant maintenance group by developing job plans and advance work schedules. Then first the planner analyzes capacity planning.

Capacity Planning:- capacity planning is the process used to determine how capacity is needed in order to execute the given work order. To do this first the planner has to consider.

Workforce Capacity: including the number of crews to execute the given job, by who is doing work, how is the work is done , and what type work is being done. After doing all the things the maintenance planner comes to organizing the work to be done.

Organizing Work: it incorporates all the workforce and material needed for the final implementation of maintenance scheduling.

Material Requirement: includes types of tools, special tools, number of tools, in general it includes all the material required to execute the given jobs.

Maintenance Scheduling: is a part where assignments of working groups are included like the number of worker skill level. Worker hours estimation, job duration information etc. during maintenance scheduling the planner have to incorporate simple work order format which contain the necessary information as listed in below. But these work format may be extended or reduced according to the maintenance activities to be held in the factory or the organization.

Request section including	Priorities:
	Equipments:
	Parts of the problems:
	Date :
Planning section including	Assigning crews :
	Labor requirement:
	Special tool requirement:
	Job estimated time & actual time:
Worker feedback includes: work related any problems, delays, etc	
Date & time started:	Date & time completed:

Maintaining safety rules & regulation for bottom component machine.

1. All the wire must be tucked/inserted neatly and correctly.
2. Tie up all lose hair before you begin.
3. One person to every machine at a time.
4. Make sure no one is to closer or distracting you.
5. Pay attention to what you're doing.
6. Turn off the power off when you have finished.
7. Do not drink or eat near any machine.

Beginning of an operation;

1. Remove dust and oil.
2. Check oil of the machine
3. Check the pneumatic supply before operating the machine.

Maintaining safe working environment:

Safety means not only preventing accidents but also doing something about poor working conditions such as very loud noise, poor light, dangerous liquids therefore in order to have a safe environment one must-

1. Follow up and respect written instructions (manuals) on how to use machines particularly a new one as well as other equipments.
2. Get detailed instruction on how to use machines, tools and chemicals like glue and solvents.
3. Never try to operate repair or adjust machine before consulting the respected authority.
4. Electric wire cable main switch must be in order & safety.
5. Format safety regulation should be applied

Self-Check 4	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers. **(Total marks 10)**

(Each question has 2 marks)

01. What is roll of planning manager maintenance in organization?

02. Write two points of safety rules & regulation for bottom component machine?

03. Write two points of safety precaution for travel head cutting machine?

04. Write two points beginning of an operation?

05. Write two points of safety precaution for stamping machine?

Information Sheet-5	Dispatch completed work

Complete a day of work in Dispatch

It’s time to see Dispatch 5 in action! mulates a workday to show real-time updating, workflow, and efficiency in both the mobile app & dispatch panel for mobile workers and operators/dispatchers.

Note: This builds on, so we recommend using the same Vehicle Tracker application and completing the exercises in order. If you haven't completed to learn how to set up the Dispatch mobile app.

Creating Your Mobile Workforce

Today, we will use your worker from (referred to as **Worker** in this and a second worker that we create.

Add a Worker

To add a second worker, follow the steps below.

1. Log in to the application as you used for as an admin user.
2. Go to the **Vehicles Panel** and click **+ New User**.
3. Select the user type **Dispatch unit** and fill in the worker info, using **Worker2** as the **username** and **name**.
4. Click **Save**.

*Tip: It is recommended to create these workers with user type Dispatch Unit OR make sure that the worker has the **_Dispatch Worker** role (**Admin > Roles**).*

Open the Dispatch Mobile App

We will be using the Dispatch mobile app, so check that you are still logged in to the Mobile App with **Exercise1Worker** from Exercise 1. When you open the app on your phone, you should open directly to the Jobs screen without logging in. If you see the job you dispatched to this worker in on the Jobs list, that is OK. If you are not logged in, refer to setup the app.

Jobs & Routes - Building the Day's Workload

You will create a job and a route in the Dispatch panel of your Vehicle Tracker application, and assign each to one of your Workers.

1. **Job** – single task assigned to one worker
2. **Route** – group of tasks (jobs) to be completed in a specific order by one worker

Create a Job

1. In the application > Dispatch panel, create a new job by clicking the **+ Job** button.
2. Fill in the required fields of **Name**, **Location**, and **Worker**. Use Worker as the worker. Other fields are optional.
3. Dispatch the job immediately to Worker by selecting **Assigned** as the job state and clicking save. After saving, you should see a new job notification on your phone. If you don't see a notification, check that you have the app launched, and that you have enabled notifications from the app in your phone settings.

Create a Route

1. Create a new route by clicking the **+ Route** button (Vehicle Tracker application > Dispatch panel).
2. Name your route and fill in the **Worker** as Worker2.
3. In the Jobs section of Add Route, click **Create Job.** Fill in the fields and save the job.
4. Create a second job in the route by clicking Create Job again and filling in the necessary information. Save the job.
5. Save the route by clicking **Save** in the **Add Route** window. You should now be able to see the route under Worker2. The jobs will be inside of blue Route buttons.
6. Right-click on the route and select **Dispatch All** to dispatch the route to Worker2.

The route is now dispatched to Worker2 and you will see the jobs are yellow to show that they have been dispatched. You will also see the route track on your map.

Completing Jobs and Routes

Completing jobs

Worker to complete the job assigned to him/her. If you have another, we will complete that job as well.

1. Open the Dispatch mobile app home screen and go to the **Jobs** tab.
2. You will see all jobs assigned to Worker on the **All jobs** tab. You will see only uncompleted jobs on the **Pending jobs** tab. Click on a job.
3. Click **Start** –Worker has now started the job.
4. Click on **Finish**. Confirm that you want to finish the job by clicking OK. The job is now completed. The job has a green line next to it on the All jobs page and will no longer show on the Pending jobs tab.
5. Do you have any other jobs? Repeat steps 2 – 4 to complete the job(s).

Check the application. You should now see the completed Jobs under Worker show in green to indicate that they are completed.

Completing Routes

To complete a route, all of the jobs on the route must be finished. In the real world, Worker2 would have his/her own phone with the Dispatch mobile app installed. Worker 2 would start and finish jobs within the app just like Worker.

If you have a second test phone, you may download the Dispatch mobile app on it and sign in as Worker2, and then start & finish all of the jobs in the assigned route as in the step above.

If you do NOT have a second phone, you can mark the jobs in Worker2's route as complete within the Vehicle Tracker application for the purpose of this (see below).

To edit/update jobs in the Vehicle Tracker application > Dispatch panel:

1. Right-click on the route under Worker. Select **Edit Route**.
2. On the Jobs section, click the **grey wrench icon** on the far right of the Job row.
3. Select Job state as **Completed** and click **Save**.
4. Use the grey wrench icon to edit the second job in the route, mark it as Completed, and save it.
5. **Save** the changes in the Edit Route window.

After the jobs in Worker2's route have been completed (in the Dispatch mobile app or in the Vehicle Tracker), they will be green to display their 'Completed' status.

Congrats! You just simulated a day's work with workers, jobs, and routes. The next is focused on reporting & data. Data allows companies to improve worker efficiency and reduce costs, so we're excited to show you the reporting capabilities.

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