



# **Skills for Employment Investment Program (SEIP)**

**COMPETENCY-BASED LEARNING  
MATERIAL**

**(STUDENT GUIDE)**

**FOR**

**LASTING AND ASSEMBLING OPERATIONS**

***(LEATHER GOODS AND FOOTWEAR SECTOR)***

**Finance Division, Ministry of Finance  
Government of the People's Republic of Bangladesh**

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## Copyright

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## How to Use this Competency-based Learning Material

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Welcome to the competency-based learning material for Lasting and Assembling Operations for use in footwear manufacturing works. These modules contain training materials and learning activities for you to complete in order to become competent and qualified as a skilled worker.

There are five (5) modules that make up this course which comprises the skills, knowledge and attitudes required to become a skilled worker including:

1. Identify lasting and assembling operation
2. Prepare upper and last for lasting
3. Perform basic lasting operation
4. Prepare upper and sole for assembling
5. Perform sole assembling operation

As a learner, you will be required to complete a series of activities in order to achieve each learning outcome of the module. These activities may be completed as part of structured classroom activities or simulated workplace demonstrations.

These activities will also require you to complete associated learning and practice activities in order to gain the skills and knowledge needed to achieve the learning outcomes. You should refer to **Learning Activity** pages of each module to know the sequence of learning tasks and the appropriate resources to use for each task.











This page will serve as the road map towards the achievement of competence. If you read the **Information Sheets**, these will give you an understanding of the work, and why things are done the way they are. Once you have finished reading the Information Sheets, you will then be required to complete the **Self-Check Quizzes**.

The self-check quizzes follow the Information Sheets in this learning guide. Completing the self-check quizzes will help you know how you are progressing. To check your knowledge after completion of the Self-Check Quizzes, you can review the **Answer Key** at the end of each module.

You are required to complete all activities as directed in the **Learning Activity and Information Sheet**. This is where you will apply your newly acquired knowledge while developing new skills. When working, high emphasis should be laid on safety requirements. You will be encouraged to raise relevant queries or ask the facilitator for assistance as required.

When you have completed all the tasks required in this learning guide, formal assessment will be scheduled to officially evaluate if you have achieved competency of the specified learning outcomes and are ready for the next task.

## List of Icons

Icon Name	Icon
Module content	
Learning outcomes	
Performance criteria	
Contents	
Assessment criteria	
Resources required	
Information sheet	
Self-check Quiz	
Answer key	
Activity	
Video reference	
Learner job sheet	
Assessment plan	
Review of competency	

## Module 1: Identify basic lasting and assembling operation

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### MODULE CONTENT

**Module Descriptor:** This module covers the skills, knowledge and attitudes to identify lasting and assembling operation. It specifically includes identifying basic operations, and identify tools, equipment and machinery used in lasting and assembling operations. It also includes information sheets, job sheets, self-checking quizzes, and answer keys.

**Nominal Duration:** 56 hours



### LEARNING OUTCOMES:

Upon completion of the module, the student/trainee should be able to:

- 1.1 Identify basic operations
- 1.2 Identify tools, equipment and machinery



### PERFORMANCE CRITERIA:

1. Lasting operations are identified and defined
2. Types of lasting are identified and described.
3. Assembling operations are identified and defined.
4. Tools and equipment used in lasting and assembling operations are identified.
5. Machinery used in lasting and assembling operations is identified.



## Learning Outcome 1.1- Identify basic operations



Contents:

- Lasting and their types- Lasting, hand lasting, machine lasting
- Lasting operations - Insole attaching to last bottom, back part moulding, toe puff attaching and upper conditioning (mulling), toe and forepart lasting, seat and side lasting



Assessment criteria:

1. Lasting operations are identified and defined
2. Types of lasting are identified and described.
3. Assembling operations are identified and defined.



Resources required:

Students/trainees must be provided with the following resources:

- Personal Protective Equipment (PPE): hand gloves, safety shoes, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: lasts, pincers, thimbles, scissors and hammers



### LEARNING ACTIVITY 1.1.1

Learning Activity	Resources/Special Instructions/References
Identify basic operations	<ul style="list-style-type: none"> <li>▪ Information Sheet: 1.1.1</li> <li>▪ Self-Check Quiz: 1.1.1</li> <li>▪ Answer Key: 1.1.1</li> </ul> <a href="https://www.youtube.com/watch?v=Kof-qlFfw6k">https://www.youtube.com/watch?v=Kof-qlFfw6k</a>



### INFORMATION SHEET 1.1.1

Learning Objective: to identify basic operations.

#### Lasting and their Types

Lasting is the process involve in stretching the upper materials over the last and securing it to the bottom of the insole with tacks or adhesive. It is the method of moulding the closed upper to the contours of the last in

such a way that the upper will conform itself to the last and when last is removed it retain its shape. Lasting is done to provide 3D shape to 2D upper.



To achieve shape retention, it is essential to apply strains at certain major points in particular direction which is known as drafting lines. The amount of strain applied must be suitable for the materials and design to achieve the best shape retention throughout the life of shoe.

The back height must be correct for specification and top line should be balanced, i.e. the outside quarter is 3mm lower than the inside quarter.

Lasting is mainly two types- hand lasting and machine lasting.

#### **Hand Lasting:**

It is the old and traditional way of shoe making where lasting is done with the hands to give upper desired shape as that of the last. The process of hand lasting is highly laborious and pain staking. In European countries hand lasting is still used for high grade shoe and surgical footwear.

The process of hand lasting starts from drafting, once the basking is done. Drafting pull from 12 different points is driven in such a way that the upper gains three-dimensional shape of last.



Operations involved in hand lasting are as follows:

1. Attaching the insole to the last.
2. Temporary lace is inserted.
3. Attaching of solvent dip toe-puff and counter stiffeners.
4. Pasting the lining with upper.
5. Placing the prepared upper on the last and drafting pull is made.
6. Lasting the toe part with 13 mm tacks spaced about 5-10 mm apart.
7. Lasting of seat part with 8 mm tacks.
8. Lasting of waist with 13 mm tacks.



## Machine Lasting:

It is the method of moulding the closed upper to the contours of the last by using machine in such a way that the stitched upper will conform the last shape and when last is removed it will retain its shape.

The amount of strain adjusted must be suitable for the materials and design to achieve the best shape retention throughout the life of shoe. The productivity of machine lasting is much higher than hand lasting.

## Lasting Operations:

- Insole attaching to last bottom
- Back part moulding
- Toe puff attaching
- Upper conditioning (mulling)
- Toe and forepart lasting
- Seat and side lasting



Insole is attached temporarily to the last bottom either by masking tape, tack, staple or hot melt adhesive to secure only for completion of lasting operation.

The stiffener is inserted between upper and lining of the counter of shoe upper and moulded to give shape of contours of the last by back part moulding machine.

Thermoplastic toe puff is positioned between the upper and lining of toe area and attached by machine.

Before forepart lasting the vamp portion of the upper with the toe puff is conditioned using steam by mulling machine to soften the thermoplastic toe-puff and upper for toe lasting.

The conditioned upper is placed on forepart lasting machine and pull down and attached the upper along with the bottom of insole by hot melt adhesive to get the shape of last. This machine has a toe band, wiper plate, toe rest, a hot melt cement injector and pincers.

The side and seat lasting are carried out to attach and secure the lasting margin of back part area with the bottom of insole with hot melt adhesives by lasting machine.

## Assembling operations:

Preparation of lasted upper:

- Heat setting is done to remove the wrinkles and to provide and retain the shape of the lasted upper.
- Wrinkle chasing by hot air blowing/ ironing is carried out to remove wrinkles and looseness from lasted upper.
- Pounding is carried out to flatten the lasting margin area for better setting and attachment of sole.
- Marking of sole wall margin is required where side wall is there with sole.
- Roughing is done to remove the grain and finish film from the complete area of lasting margin by roughing machine with emery paper and scouring is done by scouring machine with wire brush to open the fibres and help to penetrate adhesive.

Preparation of soles:

Priming - Sole priming is done using appropriate primer to improve the adhesion between the sole and the upper material.

Apply adhesive - The adhesive is applied on prepared lasted upper and sole by hand brush. Usually 1.2" round nylon brush is used in bottom cementing.

Drying adhesive layers - Sufficient time was allowed to dry the adhesive layers properly.

Reactivating upper and sole adhesive - Reactivation of both the upper and sole adhesives are done by heat reactivation machine.

Sole spotting, laying and attaching - After proper drying and heat reactivation of adhesive layers the sole is spotted and attached with upper by hand and finally pressed by sole press machine for permanent fixing.



### SELF-CHECK QUIZ 1.1.1

Write the correct answer for the following questions.

1. What is lasting?
2. What are the main types of lasting?
3. What is hand lasting?
4. Name the few methods of lasting.
5. What is machine lasting?

Fill in the blanks with the correct answer.

6. Lasting is done to provide \_\_\_\_\_ to 2D upper.
7. Lasting are mainly two types- \_\_\_\_\_.
8. The process of hand lasting starts from \_\_\_\_\_, once the basking is done.
9. Previously hand lasting used to be done on \_\_\_\_\_ or design last.
10. In European countries hand lasting is still used for high grade shoe and \_\_\_\_\_ .
11. The \_\_\_\_\_ of machine lasting is much higher than hand lasting.



## Learning Outcome 1.2 - Identify tools, equipment and machinery



Contents:

- Tools and equipment used in lasting and assembling operations
- Machinery used in lasting and assembling operations



Assessment criteria:

1. Tools and equipment used in lasting and assembling operations are identified
2. Machinery used in lasting and assembling operations is identified.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): gloves, dust mask, safety shoes, goggles, working clothes, apron
- Tools and equipment: manual handling device (box, trolley), scissors, pincers, hammers, roughie, Allen keys (size 2.5mm to 6mm), spanners (size 8mm to 19mm), needle nose pliers, screw drivers, oil can, grease gun



### LEARNING ACTIVITY 1.2.1

Learning Activity	Resources/Special Instructions/References
Identify tools, equipment and machinery	<ul style="list-style-type: none"> <li>▪ Information Sheets: 1.2.1</li> <li>▪ Self-Check Quiz: 1.2.1</li> <li>▪ Answer Key: 1.2.1</li> </ul> <a href="https://www.youtube.com/watch?v=qDKQ29XgLWo">https://www.youtube.com/watch?v=qDKQ29XgLWo</a>



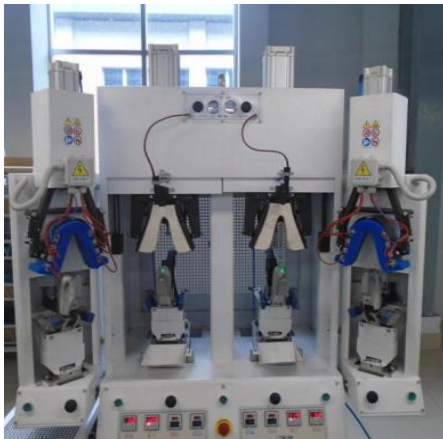
### INFORMATION SHEET 1.2.1

Learning Objective: to identify tools, equipment and machinery.

#### **Tools and equipment used in lasting and assembling operations:**

Manual handling device (box, trolley), scissors, pincers, hammers, roughie, Allen keys (size 2.5mm to 6mm), spanners (size 8mm to 19mm), needle nose pliers, screw drivers, oil can, grease gun.

**Machinery used in lasting and assembling operations:**



*Figure: Back part/counter forming machine*



*Figure: Insole attaching machine*



*Figure: Mulling/upper conditioning machine*



*Figure: Toe and forepart lasting machine*



*Figure: Toe and forepart lasting machine*



*Figure: Seat and side lasting machine*

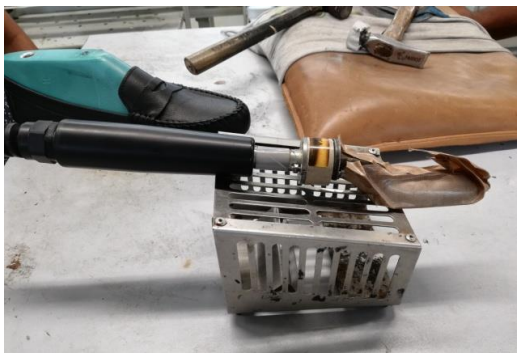




*Figure: Heat setting machine*



*Figure: Hot air blower*



*Figure: Hand ironing machine*



*Figure: Ironing with hot air blow*



*Figure: Sole margin marking machine*



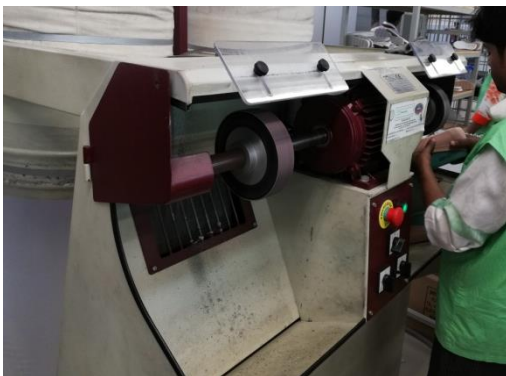
*Figure: Pounding machine*



*Figure: Sole press machine*



*Figure: Roughing machine*



*Figure: Scouring machine*



*Figure: Chilling machine*



*Figure: De-lasting machine*



*Figure: Brushing and mopping machine*

**Individual Activity:**

- *Identify the tools and equipment used in lasting and assembling operations*
- *Check the usability/function of the tools and equipment*

**Things to do during an emergency:**

- Locate where the emergency phone numbers are posted.
- If in fire incident, immediately find fire extinguisher.
- Locate and use fire alarms and fire exits.
- Refer to the building evacuation plan.
- Find other specialized equipment that can be used during emergency.



**Industry Visit:**

- Visit a footwear industry nearby.
- Observe the following activities in lasting and assembling section:
  - What tools and equipment are being used?
  - Which tools are being used in particular for lasting and assembling operations?
  - Are there sufficient lighting and ventilation facilities in the workplace?
  - Are the workers wearing adequate PPE? List out the names.
  - Anything more observed by you
- Fill-up the 'Industry Visit Format' given in your workbooks
- Present the experience group wise as per instruction of your trainer.

**INDUSTRY VISIT FORMAT**

Date of Visit	Learner Name/s
Name of industry with location	
Objectives of visit	
Works/Tasks observed	
Learning /Experiences	

Learner Signature:

Date:

Trainer Signature:

Date:

**Note: Please add extra sheet if necessary**



### SELF-CHECK QUIZ 1.2.1

Check your understanding by answering the following questions:

1. What are the operations involved in the preparation of lasted upper?
2. Why heat setting is done?
3. How do you remove wrinkles from lasted upper?
4. Write name of 5 machines used in lasting and assembling operations.
5. Mention five tools and equipment used in lasting and assembling operations.

Fill in the blanks with the correct answer.

6. Pounding is carried out \_\_\_\_\_ the lasting margin area for better setting and attachment of sole.
7. The adhesive is applied on prepared lasted upper and sole by \_\_\_\_\_.
8. Usually 1.2" round nylon brush is used in \_\_\_\_\_.
9. Sole priming is done using appropriate primer to improve \_\_\_\_\_ between the sole and the upper material.
10. After proper drying, the adhesive layers are \_\_\_\_\_ reactivation machine.





## ANSWER KEY

### ANSWER KEY 1.1.1

1. Lasting is the processes involve in stretching the upper materials over the last and securing it to the bottom of the insole with tacks or adhesive. It is the method of molding the closed upper to the contours of the last in such a way that the upper will conform itself to the last and when last is removed it retain its shape.
2. The main type of lasting is hand lasting and machine lasting.
3. Hand lasting is the old and traditional way of shoe making where lasting is done with the hands i.e. without machine to give upper desired shape as that of the last.
4. The name of few methods of lasting are lasting down, lasting up, force lasting and string lasting.
5. It is the method of moulding the closed upper to the contours of the last by using machine in such a way that the stitched upper will conform the last shape and when last is removed it will retain its shape.
6. 3D shape.
7. Hand lasting and machine lasting.
8. Drafting.
9. Wooden.
10. Surgical footwear.
11. Productivity.

### ANSWER KEY 1.2.1

1. Heat setting, wrinkle chasing/ hot air blowing/ ironing, pounding (if necessary), sole wall margin marking, roughing and scouring.
2. Heat setting is done to remove the wrinkles and to provide and retain the shape of the lasted upper.
3. Wrinkle chasing/ hot air blowing/ ironing were completed to remove wrinkles and looseness from lasted upper.
4. Machines used in lasting and assembling operations-Mulling machine, insole attaching machine, forepart/toe lasting machine, side and seat lasting machine, heat setting, sole press machine, de-lasting machine.
5. Tools and equipment used in lasting and assembling operations- Scissors, pincers, hammers, roughie, Allen keys (size 2.5mm to 6mm), spanners (size 8mm to 19mm), needle nose pliers, screw drivers, oil can, grease gun.
6. To flatten.
7. Hand brush.
8. Bottom cementing.
9. The adhesion.
10. Reactivated by.

## Module 2: Prepare upper and last for lasting

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### MODULE CONTENT

**Module Descriptor:** This module covers the skills, knowledge and attitudes to prepare the stitched upper and last for machine lasting. It specifically includes preparing for work, collect appropriate materials, performing temporary lacing with upper and attaching insole to last bottom. It also includes information sheets, job sheets, self-checking quizzes, and answer keys.

**Nominal Duration:** 56 hours



### LEARNING OUTCOMES:

Upon completion of the module, the student/trainee should be able to:

- 2.1 Prepare for work
- 2.2 Collect materials
- 2.3 Carry out temporary lacing
- 2.4 Attach insole



### PERFORMANCE CRITERIA:

1. Job specifications and instructions are read and interpreted.
2. Appropriate personal protective equipment (PPE) is identified and selected.
3. Appropriate tools and equipment are identified and selected.
4. Work bundles are received, inspected and checked as per job specification.
5. Defective materials are identified, marked and recorded as per standard operating procedure.
6. Upper is laced with temporary lace as per job specification.
7. Lacing norm is followed as per standard operating procedure.
8. Insole is secured to last button using appropriate attachment method.
9. Closed upper and lasted insole is placed into work transportation method (WTM) as per standard operating procedure.
10. Tools and equipment are cleaned, maintained and stored.
11. Machine and machine parts are cleaned as per standard operating procedure.
12. Workplace is cleaned and waste material disposed of.



## Learning Outcome 2.1 - Prepare for work



Contents:

- Job specifications
- Job instruction
- Personal protective equipment
- Tools and equipment



Assessment criteria:

1. Job specifications and instructions are read and interpreted.
2. Appropriate personal protective equipment (PPE) is identified and selected.
3. Appropriate tools and equipment are identified and selected.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): safety shoes, masks, apron, hair protector, ear guard and goggles
- Tools and equipment: scissors, hammers



### LEARNING ACTIVITY 2.1.1

Learning Activity	Resources/Special Instructions/References
Preparing for work	<ul style="list-style-type: none"> <li>▪ Information Sheet: 2.1.1</li> <li>▪ Self-Check Quiz: 2.1.1</li> <li>▪ Answer Key: 2.1.1</li> </ul> <a href="https://www.youtube.com/watch?v=QrakiqQcEUU">https://www.youtube.com/watch?v=QrakiqQcEUU</a>



### INFORMATION SHEET 2.1.1

Learning Objective: to prepare for work.

#### **Job specifications:**

A job specification is a written statement of educational qualifications, specific qualities, level of experience, physical, emotional, technical and communication skills required to perform a job, responsibilities involved in a job and other unusual sensory demands. It also includes general health, mental health, intelligence,

aptitude, memory, judgment, leadership skills, emotional ability, adaptability, flexibility, values and ethics, manners and creativity, etc.

Purpose of job specification:

- Job specification helps candidates analyse whether are eligible to apply for a particular job vacancy or not.
- It helps recruiting team of an organization understand what level of qualifications, qualities and set of characteristics should be present in a candidate to make him or her eligible for the job opening.
- Job specification gives detailed information about any job including job responsibilities, desired technical and physical skills, conversational ability and much more.
- It helps in selecting the most appropriate candidate for a particular job.




Job description and job specification are two integral parts of job analysis. They define a job fully and guide both employer and employee on how to go about the whole process of recruitment and selection. Both data sets are extremely relevant for creating a right fit between job and talent, evaluate performance and analyse training needs and measuring the worth of a particular job.

Job Instructions:

Job Instruction is a systematic method assuring that the employee can perform the job tasks correctly, safely, and consistently. They can both perform the job motions and understand why doing them that way is important.

**Personal Protective Equipment (PPE):**

PPE is safety gear or clothing designed to protect workforce from injury and disease when it is not possible to eliminate workplace hazards completely. For jobs in leather goods industry require PPE for hazards that cannot be eliminated by other means.

<p>Hand gloves:</p> <p>These are designed to protect the hands while working. Hand gloves protect hands from a variety of hazards in the workplace. Leather protects from extreme weather and penetration hazards, whereas fabric protects from dirt and abrasions. Chemical and liquid-resistant gloves prevent contamination and insulated rubber gloves are ideal for electrical work. Choose the right work gloves for your task keep your hands safe and keep working for years to come.</p>	
	<p>Safety shoes/footwear:</p> <p>To protect the feet from any harm or injury safety shoes / footwear are very important in every situation, while working in a leather goods industry.</p>
	<p>Mask:</p> <p>Mask is necessary for dust protection in your workplace and to prevent inhalation of harmful particulates. Mask respirators are designed to filter dust particles of non-toxic airborne contaminants at levels below permissible limits.</p>



**Safety cloth (overalls)/apron:**

These types of clothing have been specifically designed to protect the wearer from injury / harm in work related to setting and assembling operations.

**Eye protector/Goggles/Safety glasses:**

There are many different types of eye protector against light suited for different applications. Goggles are forms of protective eyewear that usually enclose or protect the eye area in order to prevent particulates, infectious fluids or chemicals from striking the eyes.



**Ear guard:**

An ear guard is a device that is meant to be inserted in the ear canal to protect the user's ears from loud noises or the intrusion of water, foreign bodies, dust or excessive wind.



**Safety precautions:**

- Keep aisle and exits free from obstructions and floors tidy and dry.
- Pay attention to what you are doing and what you are working with.
- Always be patient, never rush in the workshop.
- Wear safety glasses or goggles when working with dangerous tools.
- Always use a guard when working on a machine.
- Keep hands away from moving/rotating machinery.

- Use hand tools and equipment carefully.
- Know where the workshop safety equipment is located.
- Report any damage to tools/equipment as this could cause an accident.
- Inform the concern person of any accidents immediately.
- Clean up any spillages immediately, in accordance with any Safe Operating Procedures where relevant.
- Keep benches clean and free from contaminants (e.g. chemicals), sharps and tools those are not being used.
- Cover any open skin wound(s).
- Keep access to all emergency equipment e.g. fire extinguishers, first aid kits, chemical spill kits, emergency shower and eye washes free from obstruction.
- Clean work areas and equipment thoroughly after use.







**Tips to avoid accident from hazardous materials:**

- Read carefully the labels on chemicals.
- Use all protective equipment recommended by the manufacturer and employer.
- When you are done, store chemicals properly.
- Use chemicals only as directed.

**Do the SAFE thing  
 even when no one  
 is watching**



**Tools and equipment:**

<p><b>Scissors</b> Scissors are used to cut various components of footwear manually. Scissors are also used to cut uneven corner of components to ensure proper shaping of final goods.</p>	
<p><b>Hammer</b> A hammer is a basic tool used to drive tacks and nails, fit parts, flatten and smoothen the joining areas of footwear.</p>	
<p><b>Lasting pincers</b> Lasting pincers are beaked pincers with an attached hammer face. The curved pincers are designed to grip the upper leather in order to manoeuvre it onto the lasting board.</p>	
<p><b>Last</b> A last is a mechanical form that has a shape similar to that of a human foot. It is used by shoemakers and cordwainers in the manufacture and repair of shoes.</p>	

**Industry Visit:**

- Visit a leather goods industry nearby.
- Observe the following activities:
  - What tools and equipment are being used?
  - Which tools are being used in particular for setting and assembling operations?
  - Are there sufficient lighting and ventilation facilities in the workplace?
  - Are the workers wearing adequate PPE? List out the names.
  - Anything more observed by you
- Fill-up the 'Industry Visit Format' given in your workbooks
- Present the experience group wise as per instruction of your trainer.

**INDUSTRY VISIT FORMAT**

Date of Visit	Learner Name/s
Name of industry with location	

Objectives of visit	
Works/Tasks observed	
Learning /Experiences	

Learner Signature:

Date:

Trainer Signature:

Date:

**Note: Please add extra sheet if necessary**



### SELF-CHECK QUIZ 2.1.1

Write the correct answer for the following questions:

1. What is job specification?
2. Write the purpose of job specifications.
3. What is job instruction?
4. What is PPE? List five important PPE used in the workplace.
5. How can you avoid accident from hazardous materials?
6. What would you do during an emergency situation?
7. Mention five important safety precautions to be followed while working.

Fill in the blanks with the correct answer.

8. Job description and job specification are two integral parts of \_\_\_\_\_ .
9. \_\_\_\_\_ is used to protect eyes from flying particles which may cause injury to the worker.
10. \_\_\_\_\_ is used to protect oneself from inhalation of harmful particulates.
11. \_\_\_\_\_ is used to protect the hands when working.
12. \_\_\_\_\_ used to protect ones feet from sharp object to fall.
13. \_\_\_\_\_ protects workers' ears while working from unwanted sounds that are created in the workplace.





## Learning Outcome 2.2 – Collect materials



### Contents:

- Work bundles: stitched upper, moulded insole, temporary laces



### Assessment criteria:

1. Work bundles are received, inspected and checked as per job specification.
2. Defective materials are identified, marked and recorded as per standard operating procedure.



### Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): safety shoes, masks, apron, hair protector, ear guard and goggles
- Tools and equipment: scissors, hammers



## LEARNING ACTIVITY 2.2.1

Learning Activity	Resources/Special Instructions/References
Collecting material	<ul style="list-style-type: none"> <li>▪ Information Sheet: 2.2.1</li> <li>▪ Self-Check Quiz: 2.2.1</li> <li>▪ Answer Key: 2.2.1</li> </ul> <a href="https://www.youtube.com/watch?v=QrakiqQcEUU">https://www.youtube.com/watch?v=QrakiqQcEUU</a>



## INFORMATION SHEET 2.2.1

Learning Objective: to collect material.

### Work Bundles

All counted work pieces like stitched upper, temporary lace and moulded insoles are received from concerned departments. The stitched uppers are checked on the basis of quantity, quality, colour matching, defects and any other specific requirement. All records are maintained as per company guidelines. In every case the following OSH instruction should be followed.

### Occupational Health and Safety (OSH) instruction

- ❖ Clean the work area and keep it free of clutter.
- ❖ Demonstrate emergency procedures according to approved safety instructions.
- ❖ Identify and understand safety sign and symbols.
- ❖ Use the equipment safely following the specifications and standard operating procedures (SOP).
- ❖ Wear approved hearing protection whenever enter an area posted as having high levels of noise. Ensure that the hearing protection is the right type for the environment and that it is comfortable.
- ❖ OHS also adhere to basic behavioural practices and principles which must be encouraged by managers and supervisors in footwear industry at all the time:
  - Prohibit eating, chewing, drinking and smoking in work areas.
  - Make sure that workers clean and wash exposed parts of body after handling chemicals or processes involving chemicals.
  - Ensure facilities for washing, changing and storage of clothes.
  - Encourage personal hygiene of workers. Make sure that they always wash hands before eating.
  - Inform and train workers on safe work practices in handling chemicals and materials.
  - Make them competent to use different fire extinguisher.

Responsibilities of a worker in maintaining workplace occupational health and safety are as follows:

- Knowing and following the health and safety requirements that are relevant the job.
- Asking for training before beginning to work if unsure of doing a task safely
- Working safely and encouraging co-workers to do the same.
- Correcting any unsafe conditions immediately.
- Immediately reporting any injury to a first aid attendant or supervisor.



### SELF-CHECK QUIZ 2.2.1

Write the correct answer for the following questions:

1. What are the work pieces involve in work bundles?
2. How stitched uppers are checked in lasting department?
3. Write four Occupational Health and Safety (OHS) instructions.
4. What are the responsibilities of workers in maintaining workplace occupational health and safety?

Fill in the blanks with the correct answer.

5. All records are \_\_\_\_\_ as per company guidelines.
6. Clean the work area and keep it \_\_\_\_\_.
7. Identify and understand safety \_\_\_\_\_.
8. Importantly, traditional shoemakers also use a hammer during the \_\_\_\_\_.
9. Lasting pincers are beaked pincers with an \_\_\_\_\_ face.



## Learning Outcome 2.3 - Carry out temporary lacing



Contents:

- Temporary lace
- Lacing norm



Assessment criteria:

1. Upper is laced up with temporary lace as per job specification.
2. Lacing norm is followed as per standard operating process.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): safety shoes, masks, apron, ear guard and goggles
- Tools and equipment: trolley, measuring scale/tape, scissors
- Materials: stitched upper and temporary laces



### LEARNING ACTIVITY 2.3.1

Learning Activity	Resources/Special Instructions/References
Carrying out temporary lacing	<ul style="list-style-type: none"> <li>▪ Information Sheet: 2.3.1</li> <li>▪ Self-Check Quiz: 2.3.1</li> <li>▪ Answer Key: 2.3.1</li> </ul>



### INFORMATION SHEET 2.2.1

Learning Objective: to carry out temporary lacing.

#### **Temporary Lace**

As temporary lace jute rope, coarse thread, used lace, non-woven tape, etc. can be used. Temporary lacing is done to restrict opening and keep opening fixed during lasting.

### **Lacing Norm**

Temporary lace is used only for lace shoes. Depending on the number of eyelets and their gaps the length of lace is determined. Non-woven tape is stitched under elastic gusset instead of temporary lace to restrict further opening during lasting operation. A piece of pattern paper is put under the laces to prevent the impression of lace and damage of upper. All these lace and non-woven tape are removed before de-lasting.



### **SELF-CHECK QUIZ 2.3.1**

Write the correct answer for the following questions.

1. What are temporary laces? Why are they called so?
2. Why temporary lacing is done?
3. Why do nonwoven tape use under elastic gusset?
4. How do you determine the length of temporary laces for a shoe?
5. When do lace and non-woven tape remove?



## Learning Outcome 2.4 - Attach insole



Contents:

- Insole
- Method of insole attaching
- Work Transport Methods (WTM)



Assessment criteria:

1. Insole is secured to last bottom according using appropriate attachment method.
2. Closed upper and lasted insole is placed into work transportation method (WTM) as per operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- Personal Protective Equipment (PPE): safety shoes, masks, apron, ear guard and goggles
- Tools and equipment: trolley, measuring scale/tape scissors
- Materials: insole and last



### LEARNING ACTIVITY 2.4.1

Learning Activity	Resources/Special Instructions/References
Attaching insole	<ul style="list-style-type: none"> <li>▪ Information Sheet: 2.4.1</li> <li>▪ Self-Check Quiz: 2.4.1</li> <li>▪ Job Sheet 1</li> <li>▪ Answer Key: 2.4.1</li> </ul>



### INFORMATION SHEET 2.4.1

Learning Objective: to attach insole.

#### **Insole:**

An insole is the foundation of the shoe under which the closed upper is attached during lasting. It gives the firm structure of the shoe which holds the heel in position. It absorbs moisture in the form of perspiration from the foot. It is known as backbone of the shoe.

Insoles are made of leather board, cellulose board, leather, nonwoven materials, fibre board and so on.

Leather board is prepared by leather waste fibre and resin and cellulose board is made by mixing resin with cellulose fibre. Fibre board, vegetable tanned leather and nonwoven materials is also used as an insole material.

The following quality is required in an ideal insole:

- It should be strong enough to support the foot and enable to create adequate bond with upper and sole.
- It should have high dimensional stability and a firm feather edge.
- It should have a clear appearance and be durable enough.
- It should be molded easily.
- It should have ability to absorb moisture readily and dry out quickly
- It should be light weight, flexible, heat resistant and uniform in substance.



#### **Method of insole attaching:**

Insole is attached with last by masking tape, hot melt adhesive, tack, etc.

**Work Transport Methods (WTM)** - Racks, conveyor, trolleys, boxes, trays, monorails, bags, etc.

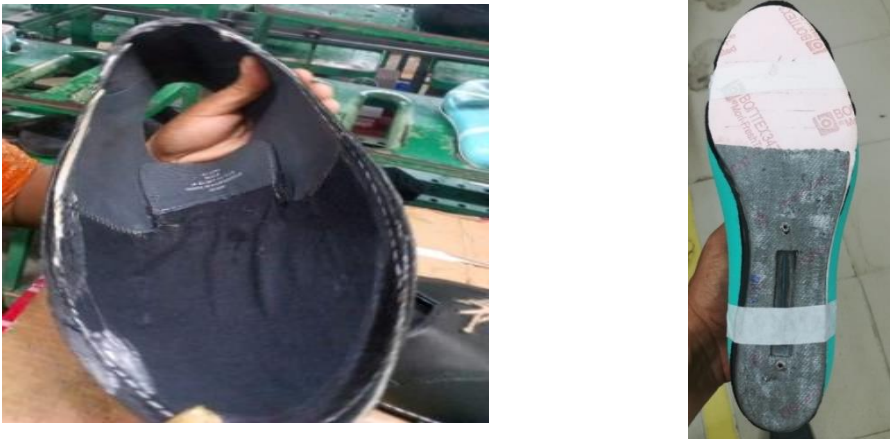


#### **SELF-CHECK QUIZ 2.4.1**

Write the correct answer for the following questions:

1. What is an insole?
2. Why insole is used?
3. Write three important required qualities of an ideal insole.
4. What are the means/ways to attach insole with last?
5. Write the name of work transport method (WTM).



JOB SHEET 1	
<b>Qualification:</b>	Lasting and assembling operations
<b>Learning unit:</b>	Prepare upper and last for lasting
<b>Learner name:</b>	
<b>Personal protective equipment (PPE):</b>	Apron, mask, ear plug, gloves (long), safety shoes
<b>Materials:</b>	Last, stitched upper, toe puff, stiffener, masking tape, temporary lace, and insole.
<b>Tools and equipment:</b>	Toe puff attaching machine, back part moulding machine, mulling machine.
<b>Performance criteria:</b>	Insole is attached properly with bottom of last. Temporary lace is inserted as per shoe requirement. Back height is properly adjusted while back part moulding
<b>Drawing, plan, diagram or sketch:</b>	
<b>Measurement:</b>	Measurement of back height taken according to size of shoe. Carefully take the measurement and adjust the back height.
<b>Notes:</b>	N/A
<b>Procedure:</b>	<ol style="list-style-type: none"> <li>1. Collect required tools, equipment, machinery and materials required for the task.</li> <li>2. Arrange materials for insole attaching.</li> <li>3. Check the profile of last and moulded insole.</li> <li>4. Attach insole with last bottom by masking tape/ hot melt adhesive/ staple pins/tacks.</li> <li>5. Place the last on lasting conveyor for next operation.</li> <li>6. Attach toe puff into the upper and lining at toe area (if not attached in upper closing section).</li> <li>7. Attach stiffener into the back part of the shoe upper fixing the exact back height.</li> <li>8. Insert temporary lace in the upper as per requirement.</li> <li>9. Adjust mulling machine.</li> <li>10. Put the upper in mulling machine for conditioning for proper lasting.</li> <li>11. Upper is ready for lasting just after the mulling operation.</li> </ol>

<b>Learner signature:</b>		<b>Date:</b>	
<b>Assessor signature:</b>		<b>Date:</b>	
<b>Assessor remarks:</b>			
<b>Feedback:</b>			





## Learning Outcome 2.5 - Clean and maintain workplace



Contents:

- Tools and equipment for cleaning
- Points to follow in storing of tools and equipment
- Good practices for storage of tools and equipment



Assessment criteria:

1. Tools and equipment are cleaned, maintained and stored.
2. Machine and machine parts are cleaned as per standard operating procedure.
3. Workplace is cleaned and waste material disposed of.



Resources required:

Students/trainees must be provided with the following resources:

- Personal Protective Equipment (PPE): safety shoes, masks, apron, ear guard and goggles
- Tools and equipment: trolley, measuring scale/tape scissors
- Materials: insole and last



### LEARNING ACTIVITY 2.5.1

Learning Activity	Resources/Special Instructions/References
Cleaning and maintaining workplace	<ul style="list-style-type: none"> <li>▪ Information Sheet: 2.5.1</li> <li>▪ Self-Check Quiz: 2.5.1</li> <li>▪ Answer Key: 2.5.1</li> </ul>



### INFORMATION SHEET 2.5.1

Learning Objective: to clean and maintain work place.

#### Tools and equipment for cleaning

A clean workplace with cleaned tools and equipment ensures a healthy and safe working environment. Cleaning is the process of removing unwanted substances, such as dirt, infectious agents, and other impurities, from an object or environment. Cleaning occurs in many different contexts, and uses many different methods. In cleaning operation, a worker can be exposed to hazardous situation. That's why they have to use personal protective equipment while working.

Cleaning can be done with following methods:




- Dusting
- Shaking and beating
- Sweeping
- Mopping
- Washing
- Polishing

Rough Cleaning:

- First remove all debris either by hand or use of brushes, brooms, scrapers, squeegees, etc.
- Collect and dispose of all debris appropriately (e.g. inedible containers).
- A warm rinse is recommended to complete the rough cleaning. Removal of excess water.
- Any areas where water has extensively pooled may serve as a medium for bacteria growth and should be dried.
- Equipment that has the potential to rust should also be dried.

**Tools and equipment used for cleaning:**

<p><b>Broom:</b></p> <p>A broom is a cleaning tool consisting of usually stiff fibres (often made of materials such as plastic, hair, or corn husks) attached to, and roughly parallel to, a cylindrical handle, the broomstick.</p>	
<p><b>Dusters:</b></p> <p>A duster is a light, loose-fitting long coat.</p>	
<p><b>Dust pan:</b></p> <p>A dustpan is used in combination with a broom. It is used to collect dust/waste/small debris.</p>	

<p><b>Brush:</b></p> <p>A brush is a tool with bristles, wire or other filaments, used for cleaning, painting, and surface finishing and for many other purposes. It generally consists of a handle to which filaments are affixed.</p>	
<p><b>Mop:</b></p> <p>A mop (such as a floor mop) is a bundle of coarse strings or a piece of cloth, sponge, or other absorbent material, attached to a stick. It is used to soak up liquid, for cleaning floors and other surfaces, to mop up dust, or for other cleaning purposes.</p>	
<p><b>Waste container:</b></p> <p>A waste container is a container for temporarily storing waste, and is usually made out of metal or plastic. Some common terms are dustbin, garbage can, trash can and dumpster.</p>	

**Lubricant:**

A lubricant is used to reduce friction between surfaces. Adequate lubrication allows smooth operation of equipment, reduces the rate of wear and prevents excessive stresses.

**Advantages of proper storage of tools, parts and equipment:**

- Ensures that tools and equipment remain in good condition and last for a long time.
- Easy to find when needed and are less likely to be lost.
- Productivity is increased because time is not lost looking for tools, parts and equipment.

**Common types of storage:**

 <p>Cabinets</p>	 <p>Bin</p>	 <p>Tool box</p>
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Tool racks



Work bench



Shelving

#### **Just checking:**

- *What are the methods by which cleaning can be done?*
- *Make a list of tools and equipment required for cleaning the workplace.*
- *What are the advantages/benefits of proper storage of tools, equipment and materials?*

#### **Points to follow in storing tools and equipment:**

1. Have a designated place for each kind of tools.
2. Label the storage cabinet or place correctly for immediate finding.
3. Store them near the point of use.
4. Wash and dry properly before storing.
5. Store knives properly when not in use with sharp edge down.
6. Put frequently used items in conveniently accessible locations.
7. Gather and secure electrical cords to prevent entanglement or snagging.
8. Make sure the areas where you are storing the equipment are clean, dry and not overcrowded.

#### **Good practices for storage of tools and equipment:**

- Tools should be properly placed on the board and labelled.
- Consider drawing the shapes of the tools on the board so that they always get put back in the same position.
- Use bins for storing small parts.








#### **SELF-CHECK 2.5**

Check your understanding by answering the following questions:

1. Name the five methods of cleaning.
2. What is broom?
3. Write the uses of mops.
4. What are the main advantages of proper storage of tools, parts and equipment?
5. What is vacuum cleaner?
6. Write five advantages of proper storage of tools and equipment.
7. What are the points to follow in storing tools and equipment?

8. Write three good practices for storage of tools and equipment.

Check your understanding by putting the appropriate answer and use as follows:

Serial No.	Figure	Write the Name
1		
2		
3		
4		
5		



## ANSWER KEY

### ANSWER KEY 2.1.1

1. A job specification is a written statement of educational qualifications, specific qualities, level of experience, physical, emotional, technical and communication skills required to perform a job, responsibilities involved in a job and other unusual sensory demands.
2. Purpose of job specification:
  - ❖ Job specification helps candidates analyze whether are eligible to apply for a particular job vacancy or not.
  - ❖ It helps recruiting team of an organization understand what level of qualifications, qualities and set of characteristics should be present in a candidate to make him or her eligible for the job opening.
  - ❖ Job specification gives detailed information about any job including job responsibilities, desired technical and physical skills, conversational ability and much more.
  - ❖ It helps in selecting the most appropriate candidate for a particular job.
3. Job Instructions: job Instruction is a systematic method assuring that the employee can perform the job tasks correctly, safely, and consistently. They can both perform the job motions and understand why doing them that way is important.
4. PPE is safety gear or clothing designed to protect you from injury and disease when it is not possible to eliminate workplace hazards completely. The six important PPE used in the workplace are:
  - Safety shoes/footwear - to protect the feet from any harms or injuries in every situation, while working in a leather goods industry.
  - Safety cloth/apron - to protect the wearer from injury / harm in work related to setting and assembling operations.
  - Hand gloves - to keep your hands safe while working.
  - Mask - to protect dust in your workplace and prevent inhalation of harmful particulates.
  - Eye protector/goggles/safety glasses - to protect the eye area in order to prevent particulates, infectious fluids or chemicals from striking the eyes.
  - Ear guard - to protect the user's ears from loud noises or the intrusion of water, foreign bodies, dust or excessive wind.
5. We can avoid accident from hazardous materials following the instructions:
  - Read carefully the labels on chemicals.
  - Use all protective equipment recommended by the manufacturer and employer.
  - When you are done, store chemicals properly.
  - Use chemicals only as directed.
6. Things to do during an emergency situation:
  - Locate where the emergency phone numbers are posted.
  - If in fire incident, immediately find fire extinguisher.
  - Locate and use fire alarms and fire exits.
  - Refer to the building evacuation plan.
  - Find other specialized equipment that can be used during emergency.
7. Five important safety precautions to be followed while working:
  - Keep aisle and exits free from obstructions and floors tidy and dry.
  - Pay attention to what you are doing and what you are working with.
  - Keep hands away from moving/rotating machinery.
  - Know where the workshop safety equipment is located.
  - Inform the concern person of any accidents immediately.
8. Job analysis
9. Eye protector/goggles/safety glasses
10. Mask
11. Hand gloves
12. Safety shoes/footwear
13. Ear protector/ear plugs/ear muffs

### ANSWER KEY 2.2.1

1. All counted work pieces like stitched upper, temporary lace and moulded insoles are received from concerned departments.
2. The stitched uppers are checked on the basis of quantity, quality, colour matching, defects and any other specific requirement. All records are maintained as per company guidelines.
3. Occupational Health and Safety (OSH) instruction
4. Clean the work area and keep it free of clutter.
5. Demonstrate emergency procedures according to approved safety instructions.
6. Identify and understand safety sign and symbols.
7. Use the equipment safely following the specifications and standard operating procedures (SOP).
4. The responsibilities of a worker in maintaining workplace occupational health and safety are as follows:
  - Knowing and following the health and safety requirements that are relevant the job.
  - Asking for training before beginning to work if unsure of doing a task safely
  - Working safely and encouraging co-workers to do the same.
  - Correcting any unsafe conditions immediately.
  - Immediately reporting any injury to a first aid attendant or supervisor.

#### **ANSWER KEY 2.3.1**

1. Jute rope, coarse thread, used lace, non-woven tape, etc. are used as temporary laces. These are called temporary lace as these are used temporarily only for lasting purpose.
2. Temporary lacing is done to restrict opening and keep opening fixed during lasting.
3. Non-woven tape is stitched under elastic gusset to restrict opening while lasting and heat setting.
4. The length of temporary lace is determined by the number of eyelets and their gaps.
5. The lace and non-woven tape are removed before de-lasting operation.

#### **ANSWER KEY 2.4.1**

1. An insole is the foundation of the shoe under which the stitched upper is attached during lasting.
2. Insole is used to give the firm structure of the shoe which holds the heel in position. It also absorbs moisture in the form of perspiration from the foot.
3. The three important required qualities of an ideal insole are as follows:
  - a. It should be strong enough to support the foot and enable to create adequate bond with upper and sole.
  - b. It should have ability to absorb moisture readily and dry out quickly.
  - c. It should be light weight, flexible, heat resistant and uniform in substance.
4. Insole is attached with last by masking tape, hot melt adhesive, tack, etc.
5. The names of work transport method (WTM) are racks, conveyor, trolleys, boxes, trays, monorails, bags, etc.

#### **ANSWER KEY 2.5**

1. Cleaning can be done with following methods:
  - Dusting
  - Shaking and beating
  - Sweeping
  - Mopping
  - Washing
  - Polishing
2. A broom is a cleaning tool consisting of usually stiff fibres (often made of materials such as plastic, hair, or corn husks) attached to, and roughly parallel to, a cylindrical handle, the broomstick.
3. Mops are used to soak up liquid, for cleaning floors and other surfaces, to mop up dust, or for other cleaning purposes.
4. Main advantages of proper storage of tools, parts and equipment are- ensures tools and equipment remain in good condition, last for a long time, easy to find when needed and are less likely to be lost.
5. A vacuum cleaner is a device that uses an air pump to create a partial vacuum to suck up dust and dirt, usually from floors and from other surfaces. The dirt is collected by a dust bag for later disposal. Vacuum cleaners exist in a variety of sizes and models.
6. Five advantages of proper storage of tools and equipment:
  - (a) Ensures the tools and equipment remain in good condition and last for a long time.
  - (b) Easy to find when needed and are less likely to be lost.
  - (c) Tools and parts are kept in good condition
  - (d) Productivity is increased because time is not lost looking for tools and equipment

- (e) Workforce or staffs develops a sense of responsibility and pride in their work.
7. Points to follow in storing tools and equipment:
    - (a) Have a designated place for each kind of tools.
    - (b) Label the storage cabinet or place correctly for immediate finding.
    - (c) Store them near the point of use.
    - (d) Wash and dry properly before storing.
    - (e) Store knives properly when not in use with sharp edge down.
    - (f) Put frequently used items in conveniently accessible locations.
    - (g) Gather and secure electrical cords to prevent entanglement or snagging.
    - (h) Make sure the areas where you are storing the equipment are clean, dry and not overcrowded.
  8. Three good practices for storage of tools and equipment:
    - Tools should be properly placed on the board and labelled.
    - Consider drawing the shapes of the tools on the board so that they always get put back in the same position.
    - Use bins for storing small parts.
  9. Broom
  10. Mop
  11. Bin
  12. Tool box
  13. Dust pan with brush



## Module 3: Perform basic lasting operation

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### MODULE CONTENT

**Module Descriptor:** This module covers the skills, knowledge and attitudes to perform basic lasting operation. It specifically includes preparing for work, performing conditioning or mulling of prepared upper, carrying out lasting operation, and cleaning and maintaining the workplace. It also includes information sheets, job sheets, self-checking quizzes, and answer keys.

**Nominal Duration:** 64 hours



### LEARNING OUTCOMES:

Upon completion of the module, the student/trainee should be able to:

- 3.1. Prepare for work
- 3.2. Perform conditioning of prepared upper
- 3.3. Carry out lasting operation
- 3.4. Clean and maintain workplace



### PERFORMANCE CRITERIA:

1. Job specifications and instructions are read and interpreted.
2. Appropriate personal protective equipment (PPE) is identified and selected.
3. Appropriate tools and equipment are identified and selected.
4. Work pieces are collected, checked and prepared as per standard operating procedure.
5. Lasting machine is tested and adjustments made, if necessary, as per manufacturer's specification.
6. Temperature of conditioning chamber is adjusted as per job specification.
7. Water level of conditioning chamber is checked and adjusted if necessary.
8. Prepared upper is placed in conditioning chamber for specified time.
9. Toe lasting is identified as per job specification.
10. Process of toe lasting is identified and described.
11. Side and seat lasting is identified as per job specification.
12. Side and seat lasting are checked as per standard operating procedure.
13. Lasting is carried out as per job specification.
14. Tools and equipment are cleaned, maintained and stored.
15. Machine and machine parts are cleaned as per standard operating procedure.
16. Workplace is cleaned and waste material disposed of.



### Learning Outcome 3.1 - Prepare for work



Contents:

- Pre-lasting operation:
  - Toe-puff attaching
  - Back part moulding
  - Upper and lining lamination
  - Feather edge stitching
  - Insole attaching
- Adjustment of machine
  - Temperature
  - Cycle/dwell time
  - Air pressure
  - Wiper temperature regulator
  - Thermoplastic rod temperature regulator
  - Pincer pull pressure regulator



Assessment criteria:

1. Job specifications and instructions are read and interpreted.
2. Appropriate personal protective equipment (PPE) is identified and selected.
3. Appropriate tools and equipment are identified and selected.
4. Work pieces are collected, checked and prepared as per standard operating procedure.
5. Lasting machine is tested and adjustments made, if necessary, as per manufacturer's specification.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: lasts, pincers, thimbles, scissors and hammers



#### LEARNING ACTIVITY 3.1.1

Learning Activity	Resources/Special Instructions/References
Prepare for work	<ul style="list-style-type: none"> <li>▪ Information Sheet: 3.1.1</li> <li>▪ Self-Check Quiz: 3.1.1</li> <li>▪ Answer Key: 3.1.1</li> </ul>



## INFORMATION SHEET 3.1.1

Learning Objective: to prepare for work.

### **Pre-lasting operation:**

Before lasting operation, work piece is prepared by following pre-lasting operations.

1. Toe-puff attaching
2. Back part moulding
3. Upper and lining lamination
4. Feather edge stitching
5. Insole attaching

### **Toe puff attaching**

The toe puff needs to be positioned in between the edge of the upper and lining to provide and retain the toe shape of shoe. Thermoplastic toe puff is attached by machine. In this case application of heat and pressure is necessary during toe puff attaching.

The purposes of toe puff attaching:

- To provide the shape of forepart of the shoe
- To facilitate the lasting operation
- To retain the shape of toe area
- To increase the productivity



### **Back part moulding/counter-stiffener attaching:**

The operation in which counter-stiffener is inserted between counter and heel grip using temperature and pressure to provide the desired shape of the shoe.

The temperature and dwell time adjusted for hot mould as 70-80°C and 10-15 sec and for cold mould -5 to -10°C and 10-15 sec.

The inserted toe-puff and stiffeners should be evenly distributed inside the upper component and lining.

Back part moulding operation has the following objectives-

- (a) To insert and attach counter stiffener between counter and heel grip.
- (b) To control the back height of the shoe.
- (c) To position the back seam in centre.
- (d) To mould back part of the upper for providing the shape of the last.
- (e) To retain the back-part shape and top line.
- (f) To increase the productivity.



### **Upper and lining lamination:**



Upper and lining is usually be laminated by latex adhesives from waist to forepart in all shoes except court shoe. This is done to facilitate the lasting operation and to produce the wrinkle free shoe.

### Feather edge stitching

Feather edge stitching is carried out to secure upper, lining and reinforcement in position while lasting. It facilitates to hold all materials together by pincer of lasting machine.



### Insole attaching:

The insole is temporarily attached to the bottom of the last by any one of the tacks, staples, masking tape or hot melt adhesive.



### Adjustment of machine for operation:

Temperature, cycle/dwell time, air pressure, wiper temperature regulator, thermoplastic rod temperature regulator and pincer pull pressure regulator, are adjusted according to the requirement of proper lasting.



### SELF-CHECK QUIZ 3.1.1

Write the correct answer for the following questions:

1. What are the operations need to perform before lasting?
2. Why toe puff is attached?
3. What is the temperature and dwell time adjusted for hot mould?
4. What is the temperature and dwell time adjusted for cold mould?
5. Why is upper and lining laminated or attached?



## Learning Outcome 3.2 - Perform conditioning of prepared upper



Contents:

- Upper conditioning or mulling



Assessment criteria:

1. Temperature of the conditioning chamber is adjusted as per job specification.
2. Water level of conditioning chamber is checked and adjusted if necessary.
3. Prepared upper is placed in conditioning chamber for specified time.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: mulling machine
- Materials: stitched upper



### LEARNING ACTIVITY 3.2.1

Learning Activity	Resources/Special Instructions/References
Perform conditioning of prepared upper	<ul style="list-style-type: none"> <li>▪ Information Sheet: 3.2.1</li> <li>▪ Self-Check Quiz: 3.2.1</li> <li>▪ Answer Key: 3.2.1</li> </ul>



### INFORMATION SHEET 3.2.1

Learning Objective: to perform conditioning of prepared upper.

#### Upper conditioning or mulling:

Before lasting the vamp portion of the upper with the toe puff is conditioned using steam in a mulling machine. This will soften the upper, increase elasticity and reduce crackiness of upper. Temperature and dwell time are adjusted for mulling machine are 100°C and 10-15 seconds for leather upper.



Common faults, causes and remedies:

Faults	Cause	Remedy
Under conditioning	Less dwell times Low temperature	Cycle time should be proper Increase temperature
Over conditioning	Excess time High temperature	Adjust appropriate dwell time Adjust temperature



### SELF-CHECK QUIZ 3.2.1

Write the correct answer for the following questions:

1. Why is upper conditioning done before lasting?
2. How much temperature and time is usually adjusted for mulling machine?
3. What are the factors determine the temperature of mulling?
4. Why the upper is under conditioned?
5. How do you control proper mulling?



### Learning Outcome 3.3 - Carry out lasting operation



Contents:

- Toe/forepart lasting
- Side and seat lasting



Assessment criteria:

1. Toe lasting is identified as per job specification.
2. Process of toe lasting is identified and described.
3. Side and seat lasting is identified as per job specification.
4. Side and seat lasting are checked as per standard operating procedure.
5. Lasting is carried out as per job specification.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: forepart lasting machine
- Materials: last with insole attached, upper after mulling



#### LEARNING ACTIVITY 3.3.1

Learning Activity	Resources/Special Instructions/References
Carry out lasting operation	<ul style="list-style-type: none"> <li>▪ Information Sheet: 3.3.1</li> <li>▪ Self-Check Quiz: 3.3.1</li> <li>▪ Answer Key: 3.3.1</li> </ul> <a href="https://www.youtube.com/watch?v=BsgMkmTvN9w">https://www.youtube.com/watch?v=BsgMkmTvN9w</a>



#### INFORMATION SHEET 3.3.1

Learning Objective: to carry out lasting operation.

##### Toe/forepart lasting

The upper is pull down on the last at the toe and vamp region and attached along the lasted margin of insole bottom.





The machine has a toe band, wiper plate, toe rest, a thermo cement injector and pincers. The conditioned upper is placed in the machine for gripping the lasting allowances of upper with its series of pincers. Teflon coated toe band is then engaged around the toe area/forepart holding the upper securely against the last above the featheredge.

Immediately a heated metal wiper plate moves inwards in a horizontal plane under the bottom of the forepart. The action wipes the lasting allowance of upper material against the insole attaching it firmly. Correct timing of machine enables the pincers to release fractionally before the final action takes place. The final downward pressure known as the “bedding pressure” ensures that the lasting allowances are pressed flat to the insole.

Machine adjustment:

Temperature: 210-250°C

Pressure: 25-35 kg/cm

Time: 10-15 seconds

The forepart lasting provides the following results:

1. Upper in the forepart area has to grip the last tightly
2. Top line should be tight and properly balanced
3. Exact toe shape to last
4. No creases at the feather edge
5. Lasting allowances are flat to the insole
6. Upper stuck to the insole firmly
7. Proper position of vamp on the last
8. Both the left and right odd of upper to match as pairs

### Side and seat lasting

Side and seat lasting are carried out to attach the upper to the insole between the vamp and heel position to provide proper shape of back part of shoe.

The lasting margin of the side is fed between two feed rollers vertically and the bottom face of the last where the insole is attached with last moves horizontally. There is a nozzle placed just after the feed roller through which the hot melt cement is deposited on the unlasted waist of insole. The rotating hot ironing roller wipes the lasting margin on to the last over the cemented area and irons the lasting margin over the insole. The heating of roller helps to melt the hot melt adhesive (cement rods) and pneumatic pressure helps to iron on the lasted margin.

The heel band grips the heel around the entire heel and the seat portion of the shoe held firmly for the seat lasting operation. The shape of heel band can be adjusted with the help of a lever to suit the shape of the seat. The wiper head is in two segments which form horse shoe shape of the heel. Seat lasting is also known as heel lasting, the machine is available for tack or cement lasting.



To achieve better result, control the following points:

- Upper tight to last, no gap between them
- No wrinkle is visible at the side and seat area

- Top line correctly balanced
- Ensure that lasting margin is properly stuck with insole

The correct side and seat lasting provides the following results:

1. Accurate back height
2. Back seam is placed centrally, upright and straight
3. Seat and quarter portions are moulded nicely
4. No crease at the feather edge
5. Top line correctly balanced.



### **SELF-CHECK QUIZ 3.3.1**

Write the correct answer for the following questions:

1. What are the parts of a forepart lasting machine?
2. What is the function of a toe band?
3. What is bedding pressure?
4. Write the usual parameters of forepart lasting machine adjustment.
5. Mention the 5 points as a result of forepart lasting.
6. Why do side and seat lasting are done?
7. What is the function of heel band?
8. What are the control points to follow for achieving better side and seat lasting?
9. Write results of correct side and seat lasting.
10. Mention the 5 points safety precautions.



### **Learning Outcome 3.4 - Clean and maintain workplace**

Same as Learning Outcome 2.5 - Clean and maintain workplace (pages 33-36)



## ANSWER KEY

### ANSWER KEY 3.1.1

1. The following operations are required to perform before lasting: toe-puff attaching, back part moulding, upper and lining lamination, feather edge stitching and insole attaching to last.
2. The toe puff is attached to provide and retain the toe shape of shoe.
3. The temperature and dwell time adjusted for hot mould is 70-80°C and 25-35 sec accordingly.
4. The temperature and dwell time adjusted for cold mould is -5 to-10°C and 15-25 sec.
5. The upper and lining is usually be laminated by latex adhesives from waist to forepart in all shoes except court shoe to facilitate lasting operation and to produce the wrinkle free shoe.

### ANSWER KEY 3.2.1

1. Upper conditioning is done before lasting to soften the upper, increase elasticity and reduce crackles which facilitates lasting.
2. The temperature and dwell time are usually adjusted 100°C and 60 seconds for usual leather upper.
3. The temperature of mulling machine is determined by the type of toe puff and upper materials.
4. The upper is resulted under conditioned due to adjustment of low temperature and less dwell time.
5. Proper mulling is controlled by adjusting appropriate temperature and dwell time.

### ANSWER KEY 3.3.1

1. The forepart lasting machine has the following parts: toe band, wiper plate, toe rest, a thermo cement injector and pincers.
2. A toe band holds the upper of toe area/forepart securely against the last above the featheredge during forepart lasting.
3. The final downward pressure which ensures the lasting allowances are pressed flat to the insole is known as the bedding pressure.
4. Forepart lasting machine adjustment parameters:
  - Temperature: 210-250°C
  - Pressure: 25-35 kg/cm
  - Time: 10-15 seconds
5. The forepart lasting provides the following results:
  - a. Upper in the forepart area has to grip the last tightly.
  - b. Top line should tight and properly balanced.
  - c. Exact toe shape to last.
  - d. No creases at the feather edge.
  - e. Lasting allowances are flat to the insole.
6. Side and seat lasting are done to attach the upper to the insole between the vamp and heel position to provide proper shape of back part of shoe.
7. The heel band grips the heel around the entire heel and the seat portion of the shoe held firmly for the seat lasting operation. The shape of heel band can be adjusted with the help of a lever to suit the shape of the seat.
8. For achieving better side and seat lasting, the following control points need to follow:
  - Upper tight to last, no gap between them.
  - No wrinkle is visible at the side and seat area.
  - Top line correctly balanced.
  - Ensure that lasting margin is properly stuck with insole.
9. The correct side and seat lasting provides the following results:
  - Accurate back height.
  - Back seam is placed centrally, upright and straight.
  - Seat and quarter portions are moulded nicely.
  - No crease at the feather edge.
  - Top line correctly balanced.
10. Safety precautions:
  - Know where the workshop safety equipment is located.
  - Report any damage to tools/equipment as this could cause an accident.

- Clean up any spillages immediately, in accordance with any safe operating procedures where relevant.
- Keep access to all emergency equipment e.g. fire extinguishers, first aid kits, chemical spill kits, emergency shower and eye washes free from obstruction.
- Clean work areas and equipment thoroughly after use.

**ANSWER KEY 3.4.1**

Same as Answer Key 2.5.1 (pages 36-37)

## Module 4: Prepare upper and sole for assembling

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### MODULE CONTENT

**Module Descriptor:** This module covers the skills, knowledge and attitudes to prepare lasted upper and sole for assembling. It specifically includes preparing for work, performing heat setting and wrinkle chasing, marking sole margin on lasted upper, carrying out roughing and scouring, applying adhesive to bottom of lasted insole and attaching filler, performing sole priming and sole cementing, and cleaning and maintaining the workplace. It also includes information sheets, job sheets, self-checking quizzes, and answer keys.

**Nominal Duration:** 56 hours



### LEARNING OUTCOMES:

Upon completion of the module, the student/trainee should be able to:

- 4.1. Prepare for work
- 4.2. Carry out heat setting and wrinkle chasing
- 4.3. Mark sole margin on lasted upper
- 4.4. Carry out roughing and scouring
- 4.5. Apply adhesive and attach filler
- 4.6. Perform priming and cementing
- 4.7. Clean and maintain workplace



### PERFORMANCE CRITERIA:

1. Job specifications and instructions are read and interpreted.
2. Appropriate personal protective equipment (PPE) is identified and selected.
3. Appropriate tools and equipment are identified and selected.
4. Heat setting is applied as per job specification.
5. Wrinkle chasing is carried out on lasted upper using hot air blower or hand iron.
6. Outsoles and lasted uppers are matched as per job specification.
7. Upper is marked as per profile of outsole margin which is to be cemented for attachment.
8. Roughing and scouring is carried out as per markings.
9. Grains and finish of lasting margin of upper are removed without damage.
10. Adhesive is applied to bottom of lasted insole as per job specification.
11. Filler is attached on bottom profile of lasted upper as per job specification.
12. Primers and cement are identified as per job specification.
13. Outsole is primed as per materials and job specification.
14. Sole cementing is carried out as per materials and job specification.
15. Tools and equipment are cleaned, maintained and stored.
16. Machine and machine parts are cleaned as per standard operating procedure.
17. Workplace is cleaned and waste material disposed of.



## **Learning Outcome 4.1- Prepare for work**

Same as Learning Outcome 2.1 - Prepare for work (pages 19-24)





## Learning Outcome 4.2 - Carry out heat setting and wrinkle chasing



Contents:

- Heat setting
- Wrinkle chasing



Assessment criteria:

1. Heat setting of lasted upper is performed as per job requirements.
2. Wrinkle chasing of lasted upper is demonstrated by using hot air blower/hand iron.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: heat setting machine, hot air blower and hand iron
- Materials: lasted upper



### LEARNING ACTIVITY 4.2.1

Learning Activity	Resources/Special Instructions/References
Carry out heat setting and wrinkle chasing	<ul style="list-style-type: none"> <li>▪ Information Sheet: 4.2.1</li> <li>▪ Self-Check: 4.2.1</li> <li>▪ Answer Key: 4.2.1</li> </ul>



### INFORMATION SHEET 4.2.1

Learning Objective: to carry out heat setting and wrinkle chasing.

#### Heat setting:

The application of heat to lasted shoes to allow the upper for better shape adoption and retention. Heat setting helps lasted uppers retain their shape by relaxing the internal stresses that would otherwise tend to pull them back to their original flat shape just after de-lasting.

The purpose of heat setting is to relax the fibres of the upper materials and it retains its shape once the last is removed. However normal heat setting methods are not suitable for work which has been lasted directly

onto the foot of a moulding machine. The machine is adjusted at temperature 100°C to 140°C for leather shoes and dwell time 3 to 4 minutes.

#### **Common faults of heat setting:**

- Fault: Cores shape of the shoe.

Cause:

- i. Improper heat setting temperature.
- ii. Inadequate time set in the heat setting m/c.
- iii. Moisture application is improper in case of suitable leather.

Remedy:

- i. Set temperature taking the degree of heat resistance of material into consideration.
- ii. Set time in relation to the material and temperature used.
- iii. Minimize moisture application for vegetable tanned upper.

- Fault: Change in appearance of finish.

Cause: Very high heat setting temperature in conjunction with improper dwell time.

Remedy: Conduct trial run to determine heat setting parameter for any particular material.



#### **Wrinkle chasing:**

Wrinkle chasing is the process of removing wrinkles from lasted upper. It is carried out to remove the wrinkles and to make leather grain smoother by hot air blow and ironing. Wrinkle chasing is carried out to remove wrinkles, tighten the grain surface and condition it to receive a later coat in dressing.

#### **Hot air blower**

Blower machine is used to remove any crease and wrinkles which are present in upper. This also tightens the grain surface and conditions it to receive a later coat of dressing.

Control points:

- Care must be taken not to burn the upper stitches, Velcro or eyelets
- Over heating can cause discoloration and damage to synthetic threads
- No wrinkle or spot in upper and feather edge
- No threads are burnt
- Temperature and time are controlled at 100-140°C and distance maintained 8-10 inches

#### **Ironing:**

This operation is used to clear the wrinkle from the upper and make the upper smooth. The aim of ironing must be to act in moderation and try to clear the defect without entirely removing the print of the grain.

When using over heated iron on shoe, serious damage may be occur to the upper by excessive heat. Iron temperature depends on the types of upper leather. Full chrome leather will stand higher temperate but vegetable, semi-chrome and synthetic will deform with a very little heat.

Care must be taken in light coloured leather (e.g. white, beige, pale, etc.) which is spoiled by the direct contact of hot iron. To avoid this problem, a Teflon paper must be stuck with iron device.



#### **Control points for ironing:**

1. Set temperature taking the degree of heat resistance of leather/materials.

2. Iron will be done all parts of the shoe upper such as top line, any corner, seat area, vamp area, toe area, facing, tongue, quarter, and feather edge.
3. Feather edge must be clean and smooth.
4. Care must be taken not to burn the upper stitches and make any spot which cannot be remove.



#### **SELF-CHECK QUIZ 4.2.1**

Write the correct answer for the following questions:

1. Why heat setting is done?
2. How much temperature and dwell time is adjusted for heat setting?
3. What is wrinkle chasing?
4. Why wrinkle chasing is carried out?
5. Write down five control points for wrinkle chasing.



### Learning Outcome 4.3 - Mark sole margin



Contents:

- Outsoles
- Marking sole margin on lasted upper



Assessment criteria:

1. Outsoles and lasted uppers are matched according to design and sizes.
2. Upper is marked according to the profile of outsole margin which to be cemented for attachment.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: marker
- Materials: lasted upper, outsole



### LEARNING ACTIVITY 4.3.1

Learning Activity	Resources/Special Instructions/References
Mark sole margin	<ul style="list-style-type: none"> <li>▪ Information Sheet: 4.3.1</li> <li>▪ Self-Check Quiz: 4.3.1</li> <li>▪ Answer Key: 4.3.1</li> </ul> <a href="https://www.youtube.com/watch?v=YfCGUVFv7dw">https://www.youtube.com/watch?v=YfCGUVFv7dw</a>



### INFORMATION SHEET 4.3.1

Learning Objective: to mark sole margin on lasted upper.

#### Outsoles

The outsole, also known as the sole, is the bottommost part of a shoe that comes in direct contact with the ground. The outsole can be made out of a variety of materials, including leather, polyvinyl chloride (PVC), thermoplastic rubber (TPR), polyurethane (PU), ethyl vinyl acetate (EVA), phylon, rubber soles (Vulcanized and unvulcanised), etc.

### Marking sole margin on lasted upper

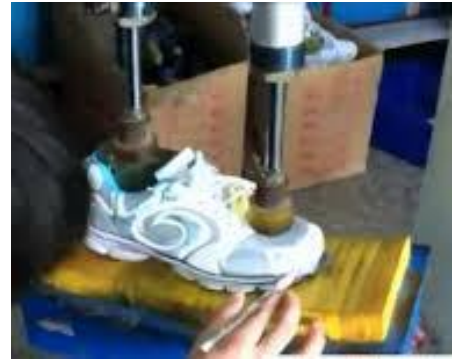
Place the lasted upper firmly on concerned sole and mark the sole wall with a suitable marker for proper roughing and scouring. Nowadays a simple machine is used to hold and mark the sole margin.



#### SELF-CHECK QUIZ 4.3.1

Write the correct answer for the following questions:

1. What is out sole?
2. Write the name materials for making outsoles.
3. How do you mark sole margin on lasted upper?





## Learning Outcome 4.4 - Carry out roughing and scouring



Contents:

- Pounding
- Roughing and scouring
- Damages



Assessment criteria:

1. Roughing and scouring is interpreted in accordance with markings.
2. Grains and finish of the lasting margin of upper are removed without damages.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: pounding machine, roughing and scouring machine
- Materials: lasted upper



### LEARNING ACTIVITY 4.4.1

Learning Activity	Resources/Special Instructions/References
Carry out roughing and scouring	<ul style="list-style-type: none"> <li>▪ Information Sheet: 4.4.1</li> <li>▪ Self-Check Quiz: 4.4.1</li> <li>▪ Answer Key: 4.4.1</li> </ul>



### INFORMATION SHEET 4.4.1

Learning Objective: to carry out roughing and scouring.

#### **Pounding**

The lasted upper is pounded to remove heavy wrinkles and to flatten the surface. A neat and clean feather edge is obtained after pounding. The machine is fitted with different tools or gadget for hammering, removing excess of material by chopping or grinding and to remove creases. A drum is fitted with spindles, having rings mounted on them. The rotating drum along with the loose rings provides hammering effect. An electrically vibrating iron piece removes creases and smoothen the material. Pounding is particularly required for high heeled ladies' shoe for flatten the heel area.

Control the points for pounding operation:

1. Top lines are clean, smooth and free from creases.
2. Toe areas are clean, smooth and without creases.

### **Roughing and scouring:**

Roughing operation is carried out to remove the grain and finish film from the whole area of lasting allowance by roughing machine with emery paper. Course grit emery paper remove finish film and grain layer of the upper.

Scouring is done after roughing by scouring machine with wire brush to open the fibres for facilitating penetration of adhesive during cementing which in long run create strong bonding of sole with upper.

Damages to upper may occur when roughing goes beyond lasting margin and deep scouring cause weakening of upper and sole strength.



### **SELF-CHECK QUIZ 4.4.1**

Write the correct answer for the following questions:

1. Why pounding is required?
2. Write two control points of pounding.
3. Why roughing is carried out?
4. Why scouring is done after roughing?
5. How does upper damage during roughing and scouring?





## Learning Outcome 4.5 - Apply adhesive and attach filler



Contents:

- Adhesives
- Filler



Assessment criteria:

1. Adhesive is applied to the bottom of lasted insole in accordance with work specifications.
2. Filler is attached on the bottom profile of the lasted upper in accordance with the thickness of upper.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): Hand gloves, safety shoes, masks, apron, finger guard, hair protector, ear guard and goggles
- Tools and equipment: adhesive pot, adhesive brush
- Materials: lasted upper, adhesive, bottom filler



### LEARNING ACTIVITY 4.5.1

Learning Activity	Resources/Special Instructions/References
Apply adhesive and attach filler	<ul style="list-style-type: none"> <li>▪ Information Sheet: 4.5.1</li> <li>▪ Self-Check Quiz: 4.5.1</li> <li>▪ Answer Key: 4.5.1</li> </ul>



### INFORMATION SHEET 4.5.1

Learning Objective: to apply adhesive and attach filler.

#### Adhesive:

An adhesive, also known as glue, cement, or paste, is any non-metallic substance applied to one surface, or both surfaces, of two separate items that binds them together and resists their separation. Different types of adhesives are used in footwear industry. Adhesive is used to attach upper with insole, filler with bottom of the lasted insole, sole with lasted upper and so on.

The properties of few adhesives are mentioned below:

- i. Latex adhesive

1. Pre-cemented and used when pressure sensitive
  2. Not very strong bond but easy to apply
  3. Soluble in water
  4. Air dry is enough
- ii. Polychloroprene or Neoprene adhesive
1. Soluble in organic solvent
  2. Film flexibility
  3. High bond strength
  4. Easy handling
  5. Application through a brush.
- iii. Polyurethane (PU) adhesive
1. Soluble in organic solvent
  2. Heat reactivation is required
  3. Used in sole attaching
  4. Bond strength is higher
- iv. Polyamide or Polyester hot melt adhesive
1. Polyamide melts at 180°C. It is light brown in colour and quite flexible
  2. Polyester melts at 220°C, fairly brittle and colour is white

Advantages:

1. Less operatives required
2. No tacks in the shoe.
3. Faster last run round allowing smaller last.

Disadvantages:

1. Setting up is more critical.
2. Needs long runs to be economical.
3. High machine cost.

**Filler:**

Light cork sheet, waste leather pieces, old rags, etc. are used as bottom filler. When selecting the bottom filler, the material must be light in weight and well flexible otherwise it may cause discomfort to the user. After lasting sometimes a cavity is formed inside the lasting margins that need to be filled by attaching filler in such a way that the curvature of the last bottom is maintained.



**SELF-CHECK QUIZ 4.5.1**

Write the correct answer for the following questions:

1. What is an adhesive?
2. Name some adhesives used in footwear industry.
3. Write four properties of polyurethane (PU) adhesive.
4. What is the melting temperature of polyamide hot melt adhesive?
5. What are the materials used as bottom filler?





## Learning Outcome 4.6 - Perform priming and cementing



Contents:

- Primers
- Priming
- Cementing



Assessment criteria:

1. Primers and cement are handled in accordance with OHS requirements.
2. Outsole is primed according to material specifications and guidelines.
3. Sole cementing is performed in accordance with materials specification.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): apron, mask, gloves (long), safety shoes
- Tools and equipment: iron free nylon brush for priming, adhesive pot, adhesive brush
- Materials: primers, adhesives



### LEARNING ACTIVITY 4.6.1

Learning Activity	Resources/Special Instructions/References
Perform priming and cementing	<ul style="list-style-type: none"> <li>▪ Information Sheet: 4.6.1</li> <li>▪ Self-Check Quiz: 4.6.1</li> <li>▪ Job Sheet 2</li> <li>▪ Answer Key: 4.6.1</li> </ul>



### INFORMATION SHEET 4.6.1

Learning Objective: to perform priming and cementing

#### **Primers and priming:**

Primers are low viscosity and low solid content material applied to the bonding surfaces before adhesive application. The main reasons why priming is carried out before applying sole attaching adhesives:

1. To remove surface contamination.

2. To enable the surface of the material to be wetted more easily by the adhesive as the viscosity of the adhesive is high.
3. To give the surface greater compatibility with the adhesive and obtain satisfactory bond.

In order to obtain satisfactory bonding between upper and synthetic soling it requires priming for surface preparation to improve the adhesion between the cement and the material surfaces.

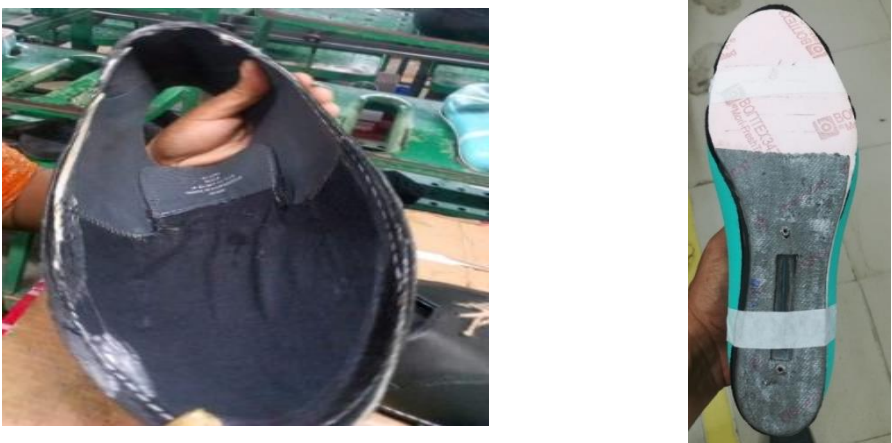
**Cementing:**



Applying adhesive on the adherent surface is known as cementing. Polyurethane and neoprene adhesives are mostly used for attachment of sole with upper. This cementing is carried out by hand brush. Usually 1.2" round nylon brush used in bottom cementing.

FAULT	CAUSE	REMEDY
Insufficient preparation	Lack of proper primer, solvent wiping or technique	Use proper wiping agent as per soling materials
Insufficient cement	Adhesive viscosity is low Applied only one coat	Use better quality adhesive Apply two coats according to the material requirement
Excess cement	Adhesive viscosity is too high Applied two coats	Use adhesive with moderate viscosity Apply one coat
Drying time high	Adhesive coat too thick Amount of hardener is less	Apply adhesive according to the material Add hardener



JOB SHEET 2	
<b>Qualification:</b>	Lasting and assembling operations
<b>Learning unit:</b>	Prepare upper and sole for bonding operation
<b>Learner name:</b>	
<b>Personal protective equipment (PPE):</b>	Apron, mask, ear plug, gloves (long), safety shoes
<b>Materials:</b>	Lasted upper, sole, emery paper
<b>Tools and equipment:</b>	Roughing and scouring machine
<b>Performance criteria:</b>	<ol style="list-style-type: none"> <li>1. Marking, roughing and scouring is done perfectly.</li> <li>2. The upper is cleaned properly and removed all dusts</li> <li>3. The sole adhesion area is cleaned.</li> <li>4. Primer is applied at adhesion area properly.</li> </ol>
<b>Drawing, plan, diagram or sketch:</b>	
<b>Measurement:</b>	N/A
<b>Notes:</b>	N/A
<b>Procedure:</b>	<ol style="list-style-type: none"> <li>1. Collect required tools, equipment, machinery and materials required for the task.</li> <li>2. Mark the area of upper for roughing as per requirement.</li> <li>3. Rough upper using roughing machine.</li> <li>4. Scour upper using roughing machine.</li> <li>5. Clean the dust from the upper.</li> <li>6. Clean the upper with selected primer as per requirement.</li> <li>7. Check the sole material for roughing if required.</li> <li>8. Carry out scouring the sole as per requirement.</li> <li>9. Remove dust from sole as per requirement.</li> <li>10. Select the primer according to sole material for activation as per requirement.</li> <li>11. Prepare the primer according to the formulation as per requirement.</li> </ol>

	12. Apply the primer on sole as per requirement.		
<b>Learner signature:</b>		<b>Date:</b>	
<b>Assessor signature:</b>		<b>Date:</b>	
<b>Assessor remarks:</b>			
<b>Feedback:</b>			

**Tips to avoid accident from hazardous materials-**

- Read carefully the labels on chemicals.
- Use all protective equipment recommended by the manufacturer and employer.
- When you are done, store chemicals properly.
- Use chemicals only as directed.



**SELF-CHECK QUIZ 4.6.1**

Write the correct answer for the following questions:

1. What are primers?
2. Why priming is carried out before applying sole attaching adhesives?
3. What is cementing?
4. How cementing is carried out?
5. Which type of brush is used in cementing?



## **Learning Outcome 4.7 - Clean and maintain workplace**

Same as Learning Outcome 2.5 - Clean and maintain workplace (pages 33-36)





## ANSWER KEY

### ANSWER KEY 4.1.1

Same as Answer Key 2.1.1 (page 24)

### ANSWER KEY 4.2.1

1. Heat setting is done by heat setter machine to retain the shape of lasted upper after de-lasting and to remove elasticity some extent. It reduces the last rotation time in a footwear industry.
2. The heat setter machine is adjusted as temperature 110°C and dwell time 2-3mins.
3. Wrinkle chasing is the process of removing wrinkles from lasted upper.
4. Wrinkle chasing is carried out to remove the wrinkles and to make leather grain smoother either by hot air blow or by ironing.
5. Control points for wrinkle chasing:
  - Care must be taken not to burn the upper stitches or eyelets
  - Over heating can cause discoloration and damage to synthetic threads
  - No wrinkle or spot in upper and feather edge
  - No threads are burnt
  - Temperature and time are controlled at 80-100°C and 40-50 seconds usually

### ANSWER KEY 4.3.1

1. The outsole, also known as the sole, is the bottommost part of a shoe that comes in direct contact with the ground.
2. The outsole can be made from a variety of materials, including leather, polyvinyl chloride (PVC), thermoplastic rubber (TPR), polyurethane (PU), ethyl vinyl acetate (EVA), phylon, rubber soles (vulcanized and unvulcanised), etc.
3. Placing the lasted upper firmly on concerned sole and mark the sole wall with a suitable marker.

### ANSWER KEY 4.4.1

1. The lasted upper is pounded to remove heavy wrinkles and to flatten the surface. A neat and clean feather edge is obtained after pounding. The machine is fitted with different tools or gadget, for hammering, removing excess of material by chopping or grinding and to remove creases.
2. Control the points for pounding operation:
  - a. Top lines are clean, smooth and free from creases
  - b. Toe areas are clean, smooth and without creases
3. Roughing operation is carried out to remove the grain and finish film from the whole area of lasting allowance by roughing machine with emery paper. Course grit emery paper remove finish film and grain layer of the upper.
4. Scouring is done after roughing by scouring machine with wire brush to open up the fibres for facilitating penetration of adhesive during cementing which in long run create strong bonding of sole with upper.
5. Upper may damage when roughing goes beyond lasting margin and deep scouring cause weakening of upper and sole strength.

### ANSWER KEY 4.5.1

1. An adhesive, also known as glue, cement, or paste, is any non-metallic substance applied to one surface, or both surfaces, of two separate items that binds them together and resists their separation.
2. Latex, polychloroprene or neoprene, polyurethane, polyamide, polyester, etc. adhesives are used in footwear industry.
3. Properties of polyurethane (PU) adhesive:
  - a. Soluble in organic solvent
  - b. Heat reactivation is required
  - c. Used in sole attaching
  - d. Bond strength is higher
4. The melting temperature of polyamide hot melts adhesive 180°C.
5. Light cork sheet, waste leather pieces, old rags, etc. are used as bottom filler. When selecting the bottom filler, the material must be light in weight and well flexible otherwise it may cause discomfort to the user.

**ANSWER KEY 4.6.1**

1. Primers are low viscosity and low solid content material applied to the bonding surfaces before adhesive application.
2. The main reasons why priming is carried out before applying sole attaching adhesives:
  - a. To remove surface contamination
  - b. To enable the surface of the material to be wetted more easily by the adhesive as the viscosity of the adhesive is high
  - c. To give the surface greater compatibility with the adhesive and obtain satisfactory bond
3. Applying adhesive on the adherent surface is known as cementing.
4. Cementing is carried out by hand brush.
5. Usually 1.2" round nylon brush used in bottom cementing.

**ANSWER KEY 4.7.1**

Same as Answer Key 2.5.1 (pages 36-37)

## Module 5: Perform assembling operations

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### MODULE CONTENT

**Module Descriptor:** This module covers the skills, knowledge and attitudes to perform assembling operations. It specifically includes preparing for work, carrying out sole attaching and pressing, chilling and cleaning operations and carrying out de-lasting and final inspection, and cleaning and maintaining the workplace. It also includes information sheets, job sheets, self-checking quizzes, and answer keys.

**Nominal Duration:** 64 hours



### LEARNING OUTCOMES:

Upon completion of the module, the student/trainee should be able to:

- 5.1. Prepare for work
- 5.2. Carry out sole attaching and pressing
- 5.3. Perform chilling and cleaning
- 5.4. Carry out de-lasting and final inspection
- 5.5. Clean and maintain workplace



### PERFORMANCE CRITERIA:

1. Job specifications and instructions are read and interpreted.
2. Appropriate personal protective equipment (PPE) is identified and selected.
3. Appropriate tools and equipment are identified and selected.
4. Upper and sole adhesives are reactivated as per manufacturer's specification.
5. Sole is attached to lasted upper without causing damage as per standard operating procedure.
6. Sole press machine is set-up and pressing is carried out as per standard operating procedure.
7. Lasted shoe is chilled as per standard operating procedure.
8. Sole and upper are cleaned and kept free from excessive adhesive.
9. Temporary laces are removed.
10. De-lasting is performed without damage of top line and seams.
11. Shoe is inspected against approved sample as per standard operating procedure.
12. Tools and equipment are cleaned, maintained and stored.
13. Machine and machine parts are cleaned as per standard operating procedure.
14. Workplace is cleaned and waste material disposed of.



## **Learning Outcome 5.1 - Prepare for work**

Same as Learning Outcome 2.1 - Prepare for work (pages 19-24)



## Learning Outcome 5.2 - Carry out sole attaching and pressing



Contents:

- Reactivation of adhesives
- Sole attaching and pressing



Assessment criteria:

1. Upper and sole adhesives are reactivated in accordance with manufacturer's specification.
2. Sole is attached to lasted upper without causing damage as per standard operating procedure.
3. Sole press machine is set-up and pressing is carried out as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): apron, mask, gloves (long), safety shoes
- Tools and equipment: sole pressing machine
- Materials: cemented upper and sole



### LEARNING ACTIVITY 5.2.1

Learning Activity	Resources/Special Instructions/References
Carry out sole attaching and pressing	<ul style="list-style-type: none"> <li>▪ Information Sheet: 5.2.1</li> <li>▪ Self-Check: 5.2.1</li> <li>▪ Answer Key: 5.2.1</li> </ul> <a href="https://www.youtube.com/watch?v=BaPEf-bNQEI">https://www.youtube.com/watch?v=BaPEf-bNQEI</a>



### INFORMATION SHEET 5.2.1

Learning Objective: to perform sole attaching and pressing.

#### Reactivation of adhesives

The dried films of cement on both upper and sole must be heat activated to soften the adhesive before the sole attachment. This operation is done by heat reactivation machine.

Temperature: 50-90°C

Time: 2-3 minutes

FAULT	CAUSE	REMEDY
Excess activation	Temperature high Dwell time high	Adjust temperature and time accurately
Insufficient activation	Insufficient temperature Insufficient dwell time	Adjust temperature and time accurately

### Sole attaching and pressing

Sole is spotted and attached carefully with lasted upper by hand immediately after reactivation. Then cemented sole are attached to the lasted upper under pressure with sole press machine. The machine is adjusted as pressure of 25-35 bar and dwell time 8-10 seconds.



FAULT	CAUSE	REMEDY
Displacement of sole and upper	Lack of operator skilling	Provide training
Upper and Sole damage	Excess pressure	Reduce pressure
Poor bond formation	Less pressure	Adjust pressure



### SELF-CHECK QUIZ 5.2.1

Write the correct answer for the following questions:

1. Why reactivation of adhesive is required?
2. What is the temperature and dwell time adjusted for heat reactivation?
3. How much pressure and dwell time is adjusted for sole press machine?



## Learning Outcome 5.3 - Perform chilling and cleaning



Contents:

- Chilling
- Cleaning



Assessment criteria:

1. Lasted shoe is chilled as per standard operating procedure.
2. Sole and upper are cleaned and kept free from excessive adhesive.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): apron, mask, gloves (long), safety shoes
- Tools and equipment: chilling machine
- Materials: resin rubber, crepe rubber



### LEARNING ACTIVITY 5.3.1

Learning Activity	Resources/Special Instructions/References
Perform chilling and cleaning	<ul style="list-style-type: none"> <li>▪ Information Sheet: 5.3.1</li> <li>▪ Self-Check Quiz: 5.3.1</li> <li>▪ Answer Key: 5.3.1</li> </ul>



### INFORMATION SHEET 5.3.1

Learning Objective: to perform chilling and cleaning.

#### Chilling

During heat setting the high-density polyethylene last is enlarged. Chilling help the last return to its original shape, set the bonding of adhesives which help to remove last during de-lasting.

Temperature and dwell time are adjusted for chilling machine is -5°C to -15°C and 2-3 minutes.



## Edge cleaning

After sole pressing, the upper is completely cleaned by resin rubber, crepe rubber, plastic wheel and washed with a cleaning fluid. If adhesive is present above the lasting margin it is very important to remove this adhesive using crepe rubber without erasing the edge ink.



FAULT	CAUSE	REMEDY
Finish film damage	Finishing materials is not compatible with upper	Select proper finishing materials
Top line damage	Lack of skill	Improve skilling



### SELF-CHECK QUIZ 5.3.1

Write the correct answer for the following questions:

1. Why chilling is required?
2. How much temperature and dwell time is adjusted for chilling machine?
3. How edge cleaning is done?





## Learning Outcome 5.4 – Carry out de-lasting and final inspection



Contents:

- De-lasting
- Checking of shoes



Assessment criteria:

1. Temporary laces are removed.
2. De-lasting is performed without damage of top line and seams.
3. Shoe is inspected against approved sample as per standard operating procedure.



Resources required:

Students/trainees must be provided with the following resources:

- Personal protective equipment (PPE): apron, mask, gloves (long), safety shoes
- Tools and equipment: de-lasting machine
- Materials: laces, shoes



### LEARNING ACTIVITY 5.4.1

Learning Activity	Resources/Special Instructions/References
Perform de-lasting and final inspection	<ul style="list-style-type: none"> <li>▪ Information Sheet: 5.4.1</li> <li>▪ Self-Check Quiz: 5.4.1</li> <li>▪ Job Sheet 3</li> <li>▪ Answer Key: 5.4.1</li> </ul>



### INFORMATION SHEET 5.4.1

Learning Objective: to perform de-lasting and checking of shoe.

#### De-lasting:


The removal of last by slipping from complete shoe is de-lasting. The last is slipped from the shoe either manually or by De-lasting machine. During last slipping care must be taken that the top line of the shoe and insole are not damaged.



### **Checking of shoes**

- ❖ The vamp length and the back height should be accurate
- ❖ The back seam should be straight
- ❖ Trim, apron, eyelet facing should not be distorted and should be uniform pair to pair
- ❖ To ensure that there is no miss stitch and no needle hole
- ❖ The insole should be smooth and free from crease
- ❖ The bonding between sole and upper should be firmed
- ❖ Grain cracks or upper tears during toe lasting
- ❖ Cut mark at any point
- ❖ Print through effect after lasting
- ❖ Extremely loose leather on quarters
- ❖ Excess scouring/roughing consequently upper is not liable to sole attaching
- ❖ Roughing comps out/cross the feather line/lasted margin



JOB SHEET 3	
<b>Qualification:</b>	Lasting and assembling operations
<b>Learning unit:</b>	Perform sole attaching, sole pressing and de-lasting
<b>Learner name:</b>	
<b>Personal protective equipment (PPE):</b>	Apron, mask, ear plug, gloves (long), safety shoes
<b>Materials:</b>	Lasted upper, sole, adhesives
<b>Tools and equipment:</b>	Adhesive pot, brush, heat reactivation machine, sole press machine, chilling machine, de-lasting machine
<b>Performance criteria:</b>	<ol style="list-style-type: none"> <li>1. Upper and sole adhesives are reactivated as per manufacturer's specification.</li> <li>2. Sole is attached to lasted upper without causing damage as per standard operating procedure.</li> <li>3. Sole press machine is set-up and pressing is carried out as per standard operating procedure.</li> <li>4. Lasted shoe is chilled as per standard operating procedure.</li> <li>5. Sole and upper are cleaned and kept free from excessive adhesive.</li> <li>6. Temporary laces are removed.</li> <li>7. De-lasting is performed without damage of top line and seams.</li> <li>8. Shoe is inspected against approved sample as per standard operating procedure.</li> </ol>
<b>Drawing, Plan, Diagram or Sketch:</b>	
<b>Measurement:</b>	N/A
<b>Notes:</b>	N/A

<b>Procedure:</b>	<ol style="list-style-type: none"> <li>1. Collect required tools, equipment, machinery and materials required for the task.</li> <li>2. Select adhesive for identified lasted upper and sole.</li> <li>3. Measure the adhesive and hardener as per standards.</li> <li>4. Mix the hardener in required adhesive properly.</li> <li>5. Apply the adhesive on sole.</li> <li>6. Apply the adhesive on bottom side up to marked area of lasted upper.</li> <li>7. Adjust temperature and time for the drying chamber.</li> <li>8. Put lasted upper and sole in forced drying chamber.</li> <li>9. Adjust temperature and time for the re-activation.</li> <li>10. Re-activate the sole and lasted upper in heat activator.</li> <li>11. Adjust press and time as required.</li> <li>12. Attach the sole with lasted upper.</li> <li>13. Place the attached sole upper in sole press machine properly.</li> <li>14. Operate sole pressing machine for proper attaching.</li> <li>15. Place the attached sole shoe in cooling chamber for plasticity.</li> <li>16. Clean the over adhesive on the upper.</li> <li>17. Cut temporary laces as required.</li> <li>18. Put the shoe on de-lasting stand (Machine)</li> <li>19. De-last the shoe from last by pulling.</li> <li>20. Check the inside of shoe for nails.</li> </ol>		
<b>Learner signature:</b>		<b>Date:</b>	
<b>Assessor signature:</b>		<b>Date:</b>	
<b>Assessor remarks:</b>			
<b>Feedback:</b>			



#### SELF-CHECK QUIZ 5.4.1

Write the correct answer for the following questions:

1. What is de-lasting?
2. Why care needs to be taken while de-lasting?
3. Write few check points of shoes.



## **Learning Outcome 5.5 - Clean and maintain workplace**

Same as Learning Outcome 2.5 - Clean and maintain workplace (pages 33-36)



## ANSWER KEY

### ANSWER KEY 5.1.1

Same as Answer Key 2.1.1 (page 24)

### ANSWER KEY 5.2.1

1. Reactivation of adhesive is required to soften the adhesive before the sole attachment.
2. The temperature and dwell time adjusted for heat reactivation is 85-90°C and 4-6 minute.
3. The pressure and dwell time adjusted for sole press machine is 800-850 psi and 35 seconds.

### ANSWER KEY 5.3.1

1. Chilling help the last return to its original shape, set the bonding of adhesives which help to remove last during de-lasting.
2. Temperature and dwell time are adjusted for chilling machine is -5°C to -15°C and 2-3 minutes.
3. Adhesive is present above the lasting margin and at the edge of sole which is cleaned using crepe rubber and resin rubber.

### ANSWER KEY 5.4.1

1. The removal of last by slipping from complete shoe is de-lasting.
2. Care needs to be taken while de-lasting to protect damage of top lie of shoe.
3. Checking of shoes:
  - The vamp length and the back height should be accurate
  - The back seam should be straight
  - Trim, apron, eyelet facing should not be distorted and should be uniform pair to pair
  - To ensure that there is no miss stitch and no needle hole
  - The insole should be smooth and free from crease
  - The bonding between sole and upper should be firmed
  - Grain cracks or upper tears during toe lasting
  - Cut mark at any point
  - Print through effect after lasting
  - Extremely loose leather on quarters
  - Excess scouring/roughing consequently upper is not liable to sole attaching
  - Roughing comps out/cross the feather line/lasted margin

### ANSWER KEY 5.5.1

Same as Answer Key 2.5.1 (pages 36-37)