

Safety Aspects in Footwear Industries

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ABSTRACT

The footwear industry is a diverse manufacturing sector which employs a wide variety of materials to make product ranging from different types and styles of footwear to more specialized shoes. Footwear industry plays an important role in the safety measures of the employees in order to prevent them from accident, disability and death. So, the employees are insisted to take part in safety programme and beware of their individual life. In the event of taking part in the safety awareness programme the employees will become more conscious on their personnel. Safety meetings are about awareness to hazards and alertness to damage. This work to facilitate industrial awareness and to communicate the key issues with the wider community of stakeholder in the footwear sector.

I. INTRODUCTION

1.1 INDUSTRIAL SAFETY

The importance of industrial safety was realized because of the fact that every year million occupational /industrial accident occurs which results in loss of production time equivalent to millions of man hours, machine hours etc.

It is therefore essential to identify the cause of industrial accidents and take steps to control them so industrial engineering is one which deals with design of efficient workplace, equipment and industrial layout design.

1.2 NEED FOR SAFETY

There are some direct cost/effects of an accident but these are certain indirect costs involved in it also.

EXAMPLE:

- Machine down time.
- Damage to machine.
- Horror created among workers
- Loss of time

So safety measures would not only eliminate /avoid above cost would mean performing their moral responsibility towards workmen/operators also.

1.3 SAFETY IN INDUSTRIES

- Increase the rate of production.
- Reduce the cost of production.
- Reducing the damage to machinery and equipment.
- Preventing unwanted suffering and point to employees of the organization.
- Preventing death of talented workers who may be an asset to the enterprise and society.

1.4 SAFETY PROGRAMMES

A safety programme is a continuous process and tries to decrease the influence of personal and environmental factors which cause accidents. Normally safety programmes consist of providing safety equipment and special training to workmen or employees. Safety precautions to be taken during manufacturing operations.

- Standards for proper lighting, ventilation and proper layout of the industrial unit.
- Standards and specification of safe industrial operations and practices etc...
- Requirement for effective maintenance of tools and equipment.
- Guidance on safe cutting and welding processes.
- Guidance on use of powered industrial trucks, belt conveyors and fire production equipment.
- Safety requirements for personal protective equipment.
- Classification of hazardous chemicals and provision of accident provision tags.
- Making for handling and labelling of dangerous items/ goods.
- Specification for safety.
- Specification for protective clothing, safety helmets, face shields and safety equipment for eyes, ears, legs, hands and feet etc...

1.5 STANDARDS FOR SAFETY

In industrial building.

- Safety procedures to be followed in electrical work.
- In use of electrical appliances in hazardous areas and explosive atmospheres.

SAFETY CONSCIOUSNESS:

Safety consciousness may be defined as 'awareness of hazards and alertness to danger'. This has a strong influence on the action of an individual because of his

desire to remain alive and uninsured we need to develop safety consciousness and make safety a value.

1.6 TO DEVELOPE SAFETY CONSCIOUSNESS:-

By observing the following eight simple steps we can establish a strong safety consciousness.

- Know the job and be thoroughly familiar with work plan.
- Make, revise and utilize job safety analysis for tasks to be done.
- Perform our own work in such a way that will not create nor leave hazards which may cause accidents involving other employees.
- Obtain training in first aid and become thoroughly familiar with knowing how to give artificial respiration.
- Take an active part in safety meetings.
- Report all hazards, unsafe practices and accidents, correct all hazards we observe and are capable of correcting the safety.
- Accept responsibility for using safety protective equipment on the job.
- Teach our own families, co-workers and others about accidents prevention.

1.7 IMPORTANCE OF SAFETY CONSCIOUSNESS IN INDIAN FOOTWEAR INDUSTRIES

- Before use any equipment, study the safety rules pertaining to equipment.
- The operation instruction and safety precautions are read and followed before operation forklift equipment,
- Wear gloves while handling warm /hot concentrate. Do not permit hot concentrate contact any part of the body as a serious burn will result.
- Training in right selection, use and maintenance of PPE

- Training right use of machinery and safety device. Redesign manual process to avoid heavy lifting activities.
- Good standard for lifting.
- Installing automatic alarms and shut off system.
- The fire department is provided with a list of stored product in premises.
- Check for hazards at work place and surrounding and notify the supervisor immediately.
- Report any injuries or accidents immediately to the instructor.
- Ensure regular cleaning and maintenance.
- Concentrate on work and do not talk with the others while working.

1.8 ELEMENTS OF SAFETY PROGRAMME

- An effective occupational safety and health programs includes the following four elements
- Management commitment and employee involvement.
- Worksite analysis.
- Hazards prevention and control.
- Safety and health training.

1.9 MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT

These are complementary elements.

- Management commitment provides motivation and resources.
- Employee allows workers to develop and express commitment to safety and health.
- Involve top management in implementing the programme.
- Encourage employee to get involved in the programme and in decisions that affect their safety and health.
- Communicate responsibility of all programme aspects. 981529696
- Managers, supervisors and employee must be held accountable for meeting their responsibility.

WORKSITE ANALYSIS:

- ✓ Examine the worksite and identify
- ✓ Existing hazards
- ✓ Conditions and operations where change might occur to create hazards.
- Management must actively analyze the work and worksite to anticipate and prevent harmful occurrence.
- Conduct a comprehensive baseline survey for health and safety.
- Conduct regular site inspection.
- Establish daily work area inspection procedures.
- Investigate accidents and “near miss” incidents. So that their causes and means for prevention is identified.

1.10 SAFETY PRECAUTIONS

- Avoid loose hair
- Avoid wearing loose shirt/clothes
- Avoid using mobile phones
- Wear proper personal protective equipment's
- Keep fire extinguisher
- Keep first aid box at the visible and reachable area
- Take care of your fingers while handling the knife
- Maintain neat floor surface
- Avoid slippery surface
- Do not talk with others while working
- Avoid wearing of ornaments
- Keep emergency exit
- Follow ergonomics
- Health check-up of individuals at specified time interval

II. SAFETY IN VARIOUS DEPARTMENTS OF FOOTWEAR INDUSTRY

The important department of shoe industries are

1. Cutting department
2. Closing department
3. Lasting and finishing department

3.1 SAFETY ASPECTS IN CUTTING DEPARTMENT



Figure1-Cutting room working position

Cutting is the term used for cutting leather components, linings, foam and reinforcement materials using patterns for making leather footwear. Cutting is done either by hand cutting or by machine cutting in the hydraulic clicking press. Hand cutting is done usually in small industries using either cardboard patterns or metal templates. Hand cutting can be carried out using scissors and knives. Hand cutting is done on inclined wooden table fitted with a galvanized zinc sheet or Teflon sheet on its top. Laying out of patterns and interlocking minimizes wastages.

3.1.1 SAFETY PRECAUTIONS IN HAND CUTTING

- Selective edge must be practiced
 - Visible part must have good grain surface and section covered could contain grain defects
 - Good cutting begins with a sharp knife. Less sharpened knife or blunt knife cuts the leather with ragged edges
 - The angle between the edge of the knife and the cutting board depends of the hardness of the material being cut. A small angle for very soft materials like fabric and a greater angle for materials like leather and reinforcement
 - Over cutting and under cutting must be avoided
 - Patterns must be placed in such a way to ensure quality, economy and minimum wastage
 - Straight-line cutting must be done first with steel scale. Curved line cuttings or irregular shapes must be cut with templates
 - Cutting must be done on a smooth surface of softwood or galvanized iron plate for cutting accuracy
 - Place the pattern on the leather and initiate cutting from left to right
 - Start cutting from top corner of the pattern and end at the right bottom corners
 - Use the least number of cutting strokes
 - Cut through the leather in one stroke
 - Avoid intermittent cutting as it may damage the components
 - Place the patterns suitably on the leathers to achieve maximum cutting with least wastage
 - Avoid imperfection in the material while cutting
 - Produce the required batch of components to match the job card and the company's productions target
 - Make sure that work area is free from hazards
 - Obtain and check the data on the job card/route card and calculate the number of components needed for production
 - Ask questions to obtain more information on task when the instructions are unclear
 - Select the tools and materials for the work
- While cutting avoid injury self/others and damaging tools
 - Avoid visible defects or imperfections on the leather while cutting
 - Agree and review the agreed upon work targets with the supervisor
 - Safely store reusable material and disposal waste
 - Points to be remember during cutting
 - Be sure about correct patterns and markings
 - Examine for defect size and shape of the skin
 - Cutting boards should be smooth for better quality of fine edge cutting

- Make sure the tools and equipment's are safe and clean to use on the material
- Check the quality and characteristics of the material match the required standards before starting to cut
- Ensure there are no defects on the leather
- Utilize leather piece efficiently to get maximum cut pieces with minimum wastage
- Use the clicking machine to cut the components
- Avoid damaging self and others
- Avoid damage to the knife and other equipment
- Avoid any imperfections in the material while cutting
- Ensure the number of cut components match the number mentioned in the job card
- Agree and review the agreed upon work targets with the supervisor
- Meet company usage and tolerances for efficient pattern interlocking
- Check the supervisor when ensure the new product details
- Minimizing the wastage, dispose waste material safely and return re-usable materials
- Work in conformance to legal requirements, organizational policies and procedures
- Use only quality tools that are sharp and in good conditions. If a tool is broken, dull or damaged, it should be tagged as such and taken out of service
- ALWAYS cut away from body and face. When cutting with one hand, workers should know where the other hand is. If a sharp tool is dropped, do not try to catch it but allow it to fall, making sure that their legs and feet are out of the way
- Concentrate on the task at hand while making straight, even cuts without rocking, prying or twisting with sharp tools. Hammering or applying excessive force or pressure to sharp and cutting tools can cause them to slip. Keep in mind, that some materials or outdoor conditions can also make tools slippery
- Do not carry sharp tool in the pocket
- Pass sharp cutting tools and the blade down; and never toss to another worker
- Stored tools in a sturdy tool box or on a tool rack with the sharp edges suitably covered. Otherwise, they should be placed near the back of work benches to keep handles or blades from extending over the edge.

3.1.2 CUTTING TOOL SAFETY

- Sharp and cutting tools can cause cuts and puncture wounds, if they are not handled properly.
- Following safety precautions must be observed while using it:
- Do not "horseplay" around sharp and cutting tools
- Maintain tools and equipment as per organization guidelines and manufacturers instruction
- Wear personal protective equipment such as safety glasses and well-fitting gloves
- Consider not only the job task but the type, hardness, and size of the material on which they'll be working while selecting tool

3.1.3 JOB SAFETY

- Defective tools or equipment
- Improperly guarded machines
- Risks/problems likely to affect services to the relevant person promptly
- Imperfections defects and damage due to mishandling
- Defects in the tools and equipment you do not have the authority to repair
- Dangerous occurrences in work place

3.1.4 SAFETY PRECAUTIONS IN MACHINE CUTTING

- The machine must be switched off when not in use

- The height adjustment between the bottom plate and the die must be properly done otherwise it will damage the material and the cutting bed
- Care must be taken by placing the single knife edged on the leather for clicking components (knife edge must be on the grain surface of the leather). If the placing is reversed, (knife edge is facing the arm and the die head is facing the grain surface of the leather), it should be replaced with a new one
- Keep all those always closed to avoid oil leakage
- Never use cotton waste to clean the machine, particularly the oil tank
- Never operate the clicking buttons are move the swing arm while replacing inside of the machine
- Attend to all hydraulic and mechanical faults only after resting the swing arm on a wooden block placed on the cutting board
- Maintenance employees follow lockout procedure before service, maintenance or repair jobs on machine/equipment
- Gather required materials, notify appropriate personnel
- Disconnect power/shutdown
- Isolate the equipment
- Attach locks/locking devices and tags
- Use safety blocks between dangerous parts that could move and injure, such as between clicking arm and cutting table
- Test controls to see that the machines cannot run.
- Release from lockout (remove warning tags)
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exists and ensure they are implemented
- Follow practice for regular safety inspections in and around workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

3.1.6 NON-NEGOTIABLE EMPLOYEE SAFETY HABITS

- Every employer is obligated to ensure that his/her workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:
 - Recognize and report safety hazards that could lead to slips trips and falls
 - Immediately report unsafe conditions to a supervisor
 - Report all injuries and accidents to the supervisor
 - Wear the correct protective equipment when required
 - Learn how too correctly use equipment provided for safety purposes
 - Beware of and avoid actions that could endanger others while working
 - Take rest breaks during the day and some time off from work during the week

3.1.5 SAFETY TIPS TO DESIGN A SAFE WORKPLACE

- Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must take it a point to:
 - Use ergonomically designed furniture and equipment to avoid stopping and twisting

3.2 CLOSING DEPARTMENT



Figure2-Closing room working position

The second section in production department is pre-closing/closing department which is equipped for closing the upper components which are clicked in the clicking department.

3.2.1 SAFETY PRECAUTIONS

- Handle materials, machinery and equipment and tool safely and correctly as per instructions of supervisor
- Use correct lifting and handling procedures
- Follow the instructions of supervisor
- Maintain a clean and hazard free working area
- Check the hazard points
- Move around the workplace with care
- Maintain tool and equipment
- Report supervisor for running maintenance
- Clean the machine
- Report unsafe equipment and other dangerous occurrences
- Ensure that the correct machine guards are in place
- Work in a comfortable position with the correct posture
- Use cleaning equipment and methods appropriate for the work to be carried out under the supervision
- Dispose of waste safely in designated location
- Store cleaning equipment after use
- Complete and store accurate records and documentation
- Report of proper lighting and ventilation
- Complete documentation use under close supervision
- Report the need for maintenance and/or cleaning outside your area of responsibility
- Check safe and correct handling of materials, equipment and tools
- Avoid stock from pilfering, theft, damage and deterioration before using any equipment, study the safety use pertaining to the equipment.
- The operation instruction and safety precautions are read and followed before operation forklift equipment.
- Wear gloves while handling warm/hot concentrate. Do not permit hot concentrate to contact any part of the body as a serious burn will result.
- Training in right selection, use and maintenance of PPE.
- Training right use of machinery and safety device. Redesign manual process to avoid heavy lifting/slash repetitive activities.
- Good standard of lighting.
- Installing automatic alarms and shutoff system.
- The fire department is provided with a list of stored product in the premises. Clean the machine with dry clothes.
- Oil the machine if required.
- Avoid slippery in the working area.
- Avoid wearing of loose clothes.
- Women's should tie their hairs smoothly.
- Take care of your fingers while operating the machine.
- Know the operating system of machines before starting working.
- Without proper knowledge do not repair the machine.
- Switch off the machines after completing of work as well as repairing the machine.
- Wear the personal protections equipment if required.

3.2.2 JOB SAFETY

- Comply with health and safety related instructions applicable to the workplace
- Use and maintain personal protective equipment as per protocol
- Carry out own activities in line with approved guidelines and procedures
- Ask supervisor for healthy lifestyle and guard against dependency on intoxicants
- Maintain proper health and safety as per supervisor instructions
- Identify and correct (if possible) malfunctions in machinery and equipment
- Report any service malfunctions that cannot be rectified
- Store materials and equipment in line with manufacturer's and organizational requirements
- Safely handle and move waste and debris
- Minimize health and safety risk to self and others due to own actions
- Seek clarifications, from supervisors or other authorized personnel in case of perceived risks
- Check the workplace and work processes for potential risks/threats to supervisors and other unauthorized personnel
- Participate in mock drills/evacuation procedures organized at the workplace
- Undertake first aid, fire-fighting and emergency response training, if asked to do so.
- Take actions based on instructions in the event of fire, emergencies or accidents
- Follow organizational procedures for shut down and evacuation when required, the machine must be cleaned and oiled periodically for smooth performance.
- The important parts, viz., shuttle, feed dog, throat plate, tension unit etc. must be periodically cleaned.
- Thread of same thickness must be used in the needle and bobbin.
- Appropriate needle must be used according to the thickness of the material.
- While changing the needle, the needle must be fixed in the correct position.
- Otherwise, not only the stitching performance gets affected but also needle may break.

3.2.3 DO'S& DON'TS

- If you don't know, or have forgotten how to use a particular piece of PPE, ask your supervisor for instruction before use.
- PPE maintained in a clean, sanitary and serviceable condition.
- Damage or defective PPE must never be used.
- Never modify your PPE in any way.
- Some PPE may have special disposal requirement. Ensure you follow them.
- If your PPE doesn't fit or is uncomfortable, tell your supervisor immediately.
- Never, ever choose not to wear PPE when it's required.

3.2.4 SAFETY GUIDELINES TO BE FOLLOWED DURING EMERGENCIES

- Check for hazards at workplace and surrounding and notify the supervisor immediately.
- Report any injuries or accidents immediately to the instructor.
- Always inspect the machine before starting to work. Ensure that all the protection guards are in place.
- Turn the motor off during cleaning and while carrying out adjustment of the machine and in emergency.
- When operating the machine, keep your hands at a safe distance from the needle.

- When operating machine, keep your hands, scissors, and other sharp objects away from the belt.
- Concentrate on work and do not talk with others while working.
- Ensure regular cleaning and maintenance.
- Carry out minor repairs only when you are very clear about the rectification. If not report to the supervisor.
- Keep first aid box at visible and reachable area
- Do not repair the machine with proper knowledge
- Keep specified interval between machines
- Take care of your fingers while handling the knife.
- Use EVA sheets for keeping dyes
- Use separate pins for scraps
- Maintain neat floor surface
- Avoid slippery surface
- Keep sign boards
- Check the machine before operating
- Know the system of machines before you are going to operate
- Check the power supply
- Check the oil before start
- Do not talk to adjacent workers
- Check the temperature, timing and pressure at specific time interval
- Avoid wearing of ornaments
- Keep emergency exit
- Follow ergonomics
- Health check-up of individuals at specified time interval
- Use metal detector
- Follow 5S's and 5P's
 - 5S's: Sort, Set, Shine, Standard, Sustain
 - 5P's: Plant, People, Process, Product, Profit

3.3 LASTING/FINISHING DEPARTMENT



Figure3-Lasting room working position

This is the last department of the footwear industry. Shoe lasting is the shoe making operation that sets the final shape of the shoe and holds it in place so the outsole can be permanently attached. The ideal shoe pattern fits the last tightly. The lasting operation will stretch the upper a bit, but not so much as to damage shoe materials

3.3.1 SAFETY PRECAUTIONS

- Avoid loose hair
- Avoid wearing of loose shirts/clothes
- Avoid using mobile phones
- Wear proper (PPE's)
- Use dry clothes for machine cleaning
- Switch off the machine after using it
- Keep fire extinguisher
- Comply with health and safety related instructions applicable to the workplace
- Use and maintain personal protective equipment as per protocol
- Carry out own activities in line with approved guidelines and procedures
- Ask supervisor for healthy lifestyle and guard against dependency on intoxicants
- Maintain proper health and safety as per supervisor instructions

III. JOB SAFETY

- Identify and correct (if possible) malfunctions in machinery and equipment
- Report any service malfunctions that cannot be rectified
- Store materials and equipment in line with manufacturer's and organizational requirements
- Safely handle and move waste and debris
- Minimize health and safety risk to self and others due to own actions
- Seek clarifications, from supervisors or other authorized personnel in case of perceived risks
- Check the workplace and work processes for potential risks/threats to supervisors and other unauthorized personnel
- Participate in mock drills/evacuation procedures organized at the workplace
- Undertake first aid, fire-fighting and emergency response training, if asked to do so.
- Take actions based on instructions in the event of fire, emergencies or accidents
- Follow organizational procedures for shut down and evacuation when required the machine must be cleaned and oiled periodically for smooth performance.
- Appropriate needle must be used according to the thickness of the material.

IV. TRAINING

Training is the organized procedure by which people acquire knowledge and/or skill for a definite purpose. It is the act of increasing the knowledge and skill of a worker for doing a certain job.

4.1 IMPORTANCE OF TRAINING

- Increased productivity.
- Higher employee morale.
- Reduced supervision.
- Reduced accident, damage to equipment and machinery.
- Increased organization stability and flexibility.

- Self -development.
- Talent locations.

V. PSYCHOLOGICAL ATTITUDE TOWARDS SAFETY PROGRAMME

TAKE SAFETY SERIOUSLY:

- There are five keys to improving worker safety attitude,
- To avoid accidents that can cause fire, explosions or other dangers.
- Avoid exposure to hazardous substance that can lead to serious illness.
- Comply with company work rules, policies and procedures.

A POSITIVE SAFETY ATTITUDE MAKES THE MOST OF COMPANY TOOLS AND TRAINING INCLUDE:

- Engineering controls such as ventilation
- Work procedures such as lockout/logout.
- Personal protective equipment such as gloves, helmet and protective eyewear
- Emergency planning such as alarms, evacuation plans and eyewashes
- Safety information such as chemical labels and material safety data sheet.

CARELESSNESS IS THE MOST COMMON CAUSE OF WORKPLACE ACCIDENTS:-

- Unsafe acts are often a factor in accidents. They result when people
- Takes attitudes like these towards safety.
- Being unsafe or angry
- Fatigue
- Recklessness
- Being afraid to ask questions

TAKE A POSITIVE ATTITUDE TOWARDS SAFETY:

- Take personal responsibility for your own safety and that of your co-workers
- Pay attention to training
- Follow easy steps in every job every time
- Know and follow safety rules
- Use required personal protective equipment
- Give work your full attention
- Keep an eye out of hazards
- Put your personal feelings and problems aside while working
- Urge your co-worker to follow safety procedure
- Know what to do in an emergency
- Ask questions about any procedure or precaution that's not clear
- Report any safety hazards you can't fire

LOOK FOR OPPORTUNITIES TO IMPROVE WORKPLACE SAFETY:

- Demonstrate that you have the right attitude towards safety,
- Volunteering for safety committees
- Taking active role in safety meetings and training sessions
- Proposing safety improvements
- Co-operating with safety inspections and monitoring
- Setting an example of a good safety attitude for others, especially new employees

VI. EFFECTIVE STEPS TO IMPLEMENT SAFETY PROCEDURE

STEP-1:MANAGEMENT COMMITMENT

Management commitment provides the motivating force and resources of organizing and controlling activities within your agency. Most important is the allocating or budgeting of money for safety manpower. The fine commitment from management needs to be an assessment or review process. An

interval team or third party can conduct this assessment.

STEP-2: EMPLOYEE INVOLVEMENT:-

Employee at every level of your agency to be involved in the safety and health process. The more employees that are involved, the better of the process is going to be. There are many opportunities for employees no participate in the safety and health programme. Several areas where employees can be used effectively include.

- Safety committees
- Incident investigation
- Inspections
- Presentation of training topics
- Emergency response teams

STEP-3: WHAT NEEDS TO BE IN WRITING? :-

- Do employees work on electrical equipment that requires lockout/tag-out
- In hot work (welding, cutting, burning) conducted in areas where a hot work permit is necessary.
- Will employees be required to wear PPE?
- Ave chemicals used that require industrial hygiene monitoring?
- Does the research laboratory need a chemical hygiene plan?
- Is a medical surveillance process needed?
- At a minimum a written safety process should include
- Proper meeting and control of safety and health hazards
- Training
- Incident reporting
- Emergency programmes and procedures
- Division of responsibility and accountability

STEP-4: CONTROLLING AND MONITORING HAZARDS:

- Practice tools for maintaining safe working conditions include
- Mechanical integrity
- Industrial hygiene and exposure assessment
- House- keeping inspections
- Corrective action systems
- Design concepts
- Operating procedures
- Safe work practices
- Site safety and health procedures

STEP-5: TRAINING:-

A critical part of training includes the “new employee orientation.” A written training schedule should be developed for each job in your agency to determine required training topics and topics that are job area specific contractors need to be aware of what is required them while performing work, what the permit programmes entail and what to do in the event of an emergency.

STEP-6: INCIDENT REPORTING AND ANALYSIS:-

Any incident should be viewed as an opportunity to better the safety and health process. A written incident without reporting system should include when and to whom the employee, visitor and contractor should report an accident, how an investigation will be conducted, who determines corrective actions and who tracks them to completion. These six steps should take your agency towards an effective safety and health programmes

VII. SOURCES OF ATMOSPHERIC POLLUTION

There are two types,

- Natural sources
- Man-made sources

NATURAL SOURCES:

Volcanic eruption, forest fires, biological decay, pollen grains, marshes etc. These pollutants are caused by the natural sources.

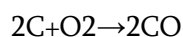
MAN-MADE SOURCES:

Thermal power plants, vehicular emission, fossil fuel burning, agricultural activities etc. These pollutants are caused by man- made sources.

4.1 COMMON ATMOSPHERIC POLLUTANTS SOURCES AND THEIR EFFECTS

CARBON-MON-OXIDE:

It is colorless, odorless gas that is poisonous to breathing animals. It is formed during the incomplete combustion of carbon containing fuel.



The human sources are cigarette smoking, incomplete burning of fossil fuels. About 77% comes from motor vehicle exhaust.

EFFECTS:

Reacts with hemoglobin in red blood cells and reduces the ability of blood to bring oxygen to the body cells and tissues when causes head ache and anemia. At high level it causes coma, irreversible brain damage cell and death.

NITROGEN DIOXIDE:

It is reddish-brown irritating gas that gives photo-chemicals smog. In the atmospheric it can be converted into nitric acid.



The sources are fossil fuel burning in motor vehicles (49%) and power industrial plants (49%). It results in lung irritation and damage.

SULPHUR DI OXIDE:

It is a colorless and irritating gas. It is formed mostly from the combustion of sulphur containing fossil fuel such as coal and oil. In the atmosphere it can be converted into sulphuric acid which is major component of acid deposition. The sources are coal burning in power plants (88%) and industrial process (10%). It results in breathing problems for healthy people.

CHROMIUM:

It is a solid toxic metal, emitted into the atmosphere as particulate matter. The sources are paint, chromium manufacture, chromium plating. It results in perforation of nasal spectrum, chrome holes.

HYDROCARBONS:

Hydrocarbons especially lower hydrocarbons get accumulates. Due the decay of vegetable matter. The sources are agriculture, decay of plants etc. It results in carcinogenic.

OZONE:

Highly reactive irritating gas with unpleasant odor that forms in troposphere. It is a major component of photochemical smog. The sources are chemical reaction with utile organic compounds (emitted mostly by cars and industries) and nitrogen oxides. It results in moderate the climate.

4.2 CONTROL MEASURES OF ATMOSPHERIC POLLUTANTS AND SOURCE CONTROL

- Use only unleaded petrol.
- Use only petroleum products and other fuels that have low sulphur and ash content.
- Reduce the number of private vehicles on the road by developing efficient public transport system and encouraging people to walk or use cycle.

- Plant trees along the busy streets because they remove particulates and carbon monoxide and absorb noise.
- Industrial and waste disposal sites should be situated outside the city center.
- Use catalytic convertor to help control the emission of carbon monoxide and hydrocarbons.

4.3 EQUIPMENTS USED TO CONTROL AIR POLLUTION

- To use mechanical devices such as cyclones, bag houses etc.
- To ensure sufficient supply of oxygen to the combustion chamber and adequate temperature so that combustion is complete, eliminating much of the smoke consisting of partly burnt ashes and dust.
- Chemical treatment to deal with factory fumes. The disposal of the collected air pollutants is equally important for successful control of air pollutions.

VIII. MATERIAL HANDLING HAZARDS



Figure4-Material handling position

Material handling (lifting, pushing, pulling, carrying, cutting) wrong posture and techniques, heavy load.

USAGE OF MATERIAL HANDLING EQUIPMENT

- Hand tools.
- Packing or de-packing material.

PRECAUTIONS:

- Manual handling: Use proper lifting technique, move or carry items with personal ability, seek help, use material handling equipment
- Usage of material handling equipment: Trained on safe use of equipment, not to overload, secured items and not to block sight of view
- Hand tools: Use of suitable and hand tools free of defects, correct handling technique
- Packing or de-packing materials: Beware of nipping hazard, sharp edges or objects such as nails, wear protective gears

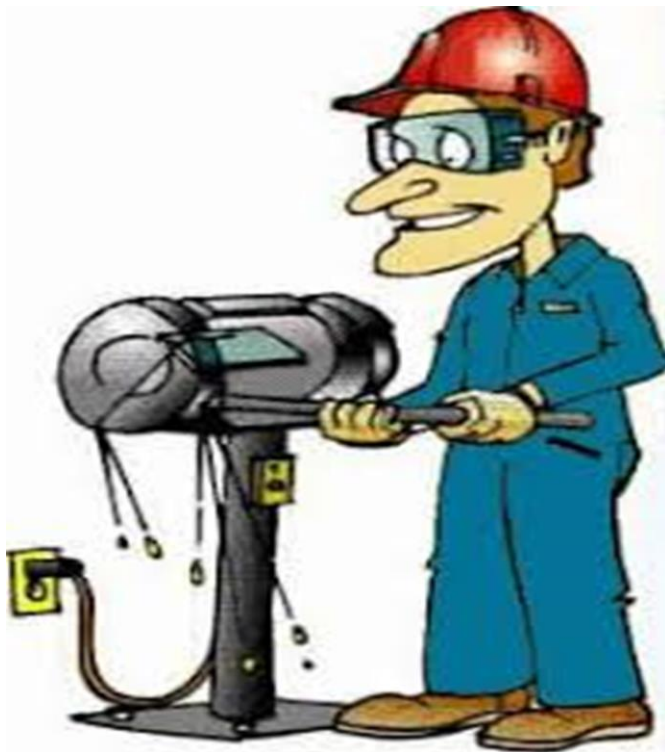
8.1 MECHANICAL HAZARDS

Figure5-Mechanical hazards

- A mechanical hazard is any hazard involving a machine or process.
- Motor vehicles, air crafts, and air bags pose mechanical hazard.
- Compressed gases or liquids can also be considered a mechanical hazard.
- In normal use or subjected to reasonably or manufacture present on unreasonably risk of personal injury or illness.

PRECAUTION:

- Protrusion lookout of protrusion and place cushion over protruded portion
- Sharp edges wear suitable gloves
- Moving parts/machinery do not expose, ensure proper fencing, guarding or control are in place before working. Do not attempt to remove any material stuck in any parts of the machinery. No loose clothing or items. If guarding or safety device removed, inform supervisor
- Nipping or pinch points do not remove any stuck at the pinch point. No loose clothing or items
- Sudden motion keep a safe distance from equipment or machine that can suddenly operate or move
- Flying chips wear eye protection (impact goggles or glass)
- Hand tools use suitable and hand tools free of defects, correct handling technique
- Vibration wear glove which will provide adequate insulation to absorb vibration

8.2 ELECTRICAL HAZARD

Figure6-Electrical Hazards

- In advertent activation during inspection, servicing, cleaning or repair.
- Electrical overloading.
- Contact with water or wetlands.

- Exposed inner cable or copper wiring.
- Defective or broken plugs, sockets or appliances.
- Untrained personnel.

PRECAUTION:

- In advertent lockout and tag out procedure
- Electrical overloading earth leakage circuit breaker, avoid overloading
- Contact with water or wet lands do not handle any electrical appliances with wet hands, to provide weather proof plugs or sockets when appliances are near water source
- Exposed inner cables or copper wiring do not touch wiring, inform supervisor
- Defective or broken plugs, sockets or appliances do not use inform supervisor
- Untrained personnel do not terminate or deal with live wiring

- Handle hazardous substance inside fume hood or with local exhaust ventilation. If not feasible, appropriate and suitable respirator to be worn
- Contact supervisor for any spills
- Decontaminate any surface if there is stain of HS on any item, apparatus or equipment
- Wear suitable personal protective gear such as glove, apron, respirator, goggles, or face shield and rubber boots when handling chemicals
- Know where are the nearest eye wash stations and emergency showers
- Wash eyes or flush other parts of body immediately and thoroughly with water when splash with chemicals. Inform supervisor and seek medical aid subsequently. Discard any contaminated clothing including under garment

8.3 CHEMICAL HAZARDS



Figure7-Chemical Hazards

- Inhalation of air born dust, fiber, fumes or vapors.
- Ingestion of toxic substances
- Skin contact with chemicals.

PRECAUTIONS:

- Refer to safety data sheet before handling any chemical

8.4 PHYSICAL HAZARDS



Figure7-Physical Hazards

- Openings on floor.
- Working on heights.
- Vehicles (forklift, crane).
- Falling objects/weights.
- Heat stress
- Cold stress
- Poor lighting weather (raining, lightning, flood).

PRECAUTIONS:

- Falling objects/weights do not work under any load or enter area that is barricaded. Wear safety helmet and keep with demarcating lines
- Loud noise wear ear protection such as ear plugs or muffler
- Heat stress wear light clothing, drink adequate amount of water and take sufficient rest
- Cold stress wear sufficient warm clothing
- Poor lighting request to work in area with adequate lighting if eyes are straining to concentrate
- Whether find sheltered area to hide if working in the open, wear rain-coat. In areas where there is possibility of flooding, put on life jacket

IX. CONCLUSION

It is conclude that safety is an key factor to control the major aspects like

- Increase the rate of production.
- Reduce the cost of production.
- Reducing the damage to machinery and equipment.
- Preventing unwanted suffering and point to employees of the organization.
- Preventing death of talented workers who may be an asset to the enterprise and society.

This research work will helps to create the industrial safety awareness and to communicate the key issues with the winder community of stakeholder in the footwear sector.

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PPE	PROTECTION
	Eye and face protection
	Hearing protection
	Head protection
	Hand and arm protection
	Respiratory protection
	Whole body protection

Figure8-PPE and their uses