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Take the Right Steps by Sara Wesche

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Sara Wesche from Summit Training talks us through the important issues to consider in the selection & use of footwear, an important element of PPE in every industrial workplace.

Why did humans begin wearing shoes? To protect their feet? To keep warm? To accessorise an outfit?

In prehistoric times skins or hides may have been tied around the foot for protection & warmth; studies of the foot bones of ancient humans suggest that some form of sturdy footwear was worn by human beings beginning between 40,000 & 26,000 years ago.

The shoes found with the 5,300-year-old 'Ice Man' in the Tyrolean Alps were made of skins & braided-bark netting & stuffed with straw & moss. The sandal, a very early form of the shoe, was worn in Egypt, Greece, and Rome. A more ancient example (8000 BC), woven from plant materials, was found in an Oregon (USA) cave. An early form of the boot was also known in Greece & Rome.

Even in prehistoric times, humans rationalised the need to protect their bodies, including the feet. Survival depended on the ability to flee from danger, hunt & gather, and search out shelter. A caveman without the use of his feet would more than likely not live for long.1

Thankfully, today we have many modern conveniences that allow us to live easily & without as much dependence on the fitness of our bodies.

Nonetheless, a lifetime without the use of our feet would be devastating to most. Our feet carry us through a world of activities, and they take a lot of abuse on a day to day basis.

When on the job, there are a number of actions and situations that present hazards for our feet & lower legs & it is important that workers wear the proper foot protection for the job. The range of protective footwear is wide, and there are various requirements & recommendations for almost every industry. From the service industry to construction, selecting the right footwear can make or break the lifelong health of your feet.

Hazard Assessment

The first step in footwear selection is to conduct a hazard assessment of the work environment. A hazard assessment is extremely important & should not be overlooked. The type of protective footwear you choose will depend on the hazards to which the worker is exposed.

Hazards to the foot include equipment, electricity, chemicals, sharp objects, and machinery. Exposure to these hazards can result in broken bones, burns, or in extreme cases, amputation & loss of the use of the foot & lower leg.

It is your responsibility as the employer or safety supervisor to conduct a hazard assessment of your site. A hazard assessment is not a one time job. Job sites change, some more frequently than others, such as a construction site, so it is imperative that a hazard assessment is conducted on a regular basis, as well as when alterations are made to the site, such as new equipment or changes in procedures. This periodic reassessment should also include a review of injury & illness records to spot any trends or areas of concern, & to take appropriate corrective action. The suitability of existing PPE, including an evaluation of its condition & age, should be included in the reassessment.

Potential hazards may be physical or health related, and a comprehensive hazard assessment should identify hazards in both categories. Examples of physical hazards include moving objects, fluctuating temperatures, high intensity lighting, rolling or pinching objects, electrical connections, and sharp edges.

Examples of health hazards include over exposure to harmful dusts, chemicals or radiation. The hazard assessment should begin with a walk through survey of the facility to develop a list of potential hazards in the following basic hazard categories:

- Impact
- Penetration
- Compression (roll-over)
- Chemical
- Heat/cold
- Harmful dust
- Light (optical) radiation
- Biologic

In addition to noting the basic layout of the facility & reviewing any history of occupational illnesses or injuries, things to look for during the walk through survey include:

- Sources of electricity
- Sources of motion, such as machines or processes where movement may exist that could result in an impact between personnel & equipment
- Sources of high temperatures that could result in burns, eye injuries or fire
- Types of chemicals used in the workplace
- Sources of harmful dusts
- Sources of light radiation, such as welding, brazing, cutting, furnaces, heat treating or high intensity lights
- The potential for falling or dropping objects
- Sharp objects that could poke, cut, stab or puncture
- Biologic hazards such as blood or other potentially infected material2

On a daily basis, take note of any changes in the work environment. Take note of what is new, what is out of place, & what is different. Something as simple as an odd smell could be the indicator of a new hazard. If you operate multiple work shifts, maintain a reporting system for when you are not on the job that can help you indicate any irregularities. Ask the shift supervisor to note any changes, maintenance or housekeeping that may have occurred during the shift. This can help you determine hazards that arise over time & when an employee may be exposed to a new hazard.

When the walk through is complete, organise & analyse the data so that it may be efficiently used in determining the proper types of PPE required at the worksite. When you understand the hazards, you can make a more educated decision on the type of footwear your workers need to be properly protected.

Examples of situations in which an employee should wear foot and/or leg protection include:

- When heavy objects, such as barrels or tools, have the potential to roll onto or fall on the employee's feet
- Working with sharp objects, such as nails or spikes, that could pierce the soles or uppers of ordinary shoes?
- Exposure to molten metal that might splash on feet or legs
- Working on or around hot, wet or slippery surfaces
- Working when electrical hazards are present

Footwear selection

When you have identified the hazards, the next step is to select the proper shoe for the job. It is important to remember that the type of shoe is selected by the hazards the worker is exposed to on the job, not the industry you work in. If worker responsibilities change daily, resulting in exposure to different hazards or environments, their shoes must change with them.

There are multiple options for protecting your feet & lower legs, including:

• Leggings protect the lower legs & feet from heat hazards, such as molten metal or welding sparks. Safety snaps allow leggings to be removed quickly

• Metatarsal guards protect the instep area from impact & compression. Made of aluminum, steel, fibre or plastic, these guards may be strapped to the outside of shoes

Toe guards fit over the toes of regular shoes to protect the toes from impact & compression hazards. They may be made of steel, aluminum or plastic

• Combination foot & shin guards protect the lower legs & feet, and may be used in combination with toe guards when greater protection is needed

• Safety shoes or boots have impact resistant toes & heat resistant soles that protect the feet against hot work surfaces common in roofing, paving, and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds. Safety shoes may also be designed to be electrically conductive to prevent the buildup of static electricity in areas with the potential for explosive atmospheres, or nonconductive to protect workers from workplace electrical hazards 2

In addition to the above, there are specialty shoes used by workers in extreme conditions or who are exposed to explosive or electrical hazards.

Electrically conductive shoes

These provide protection against the buildup of static electricity. Employees working in explosive & hazardous locations, such as explosives' manufacturing facilities or paint shop, must wear conductive shoes to reduce the risk of static electricity buildup on the body that could produce a spark/ explosion or fire.

Foot powder/balm should not be used in conjunction with protective conductive footwear because it provides insulation, thereby reducing the conductive ability of the shoes. Only cotton socks should be worn with conductive footwear.

Conductive shoes must be removed when the task requiring their use is completed. Employees exposed to electrical hazards must never wear conductive shoes2.

Electrical hazard, safety-toe shoes

These are nonconductive & will prevent the wearers' feet from completing an electrical circuit to the ground. These shoes can protect against open circuits of up to 600 volts in dry conditions & should be used in conjunction with other insulating equipment & additional precautions to reduce the risk of a worker becoming a path for hazardous electrical energy.

The insulating protection of electrical hazard, safety-toe shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers touch conductive, grounded items. Nonconductive footwear must not be used in explosive or hazardous locations2.

Foundry shoes

In addition to insulating the feet from the extreme heat of molten metal, foundry shoes keep hot metal from lodging in shoe eyelets, tongues or other shoe parts. These snug fitting leather or leather-substitute shoes have leather or rubber soles & rubber heels. All foundry shoes must have built in safety toes2.

In general

Each pair of safety footwear has a code that is printed, stamped, or stitched onto one of the shoes. This label identifies the type of protection the shoes provide. Each line of the label lists specific information. Label information may include the gender the shoe was intended for, protection code, impact resistance, if the shoe is steel toed (if yes, the label will note impact & compression ratings), metatarsal resistance, and specific hazards the shoe is designed to protect against, such as electrical resistance.

Label information & requirements will differ from country to country. For example, the USA, Canada, and Europe each have their own labelling requirements & information. Be sure that your footwear meets the standards of the country in

which you are working. You can access information for the United States at www.osha.gov or www.ansi.org, for Canada at www.csa.ca & for Europe at www.osha.europa.eu

The International Organization for Standardization provides the European standard for safety footwear. The current one is ISO 20345:2011. The codes applicable to European safety footwear are:

Slip resistant footwear

According to published research by the Liberty Mutual Research Institute for Safety, same-level slips & falls represent nearly 11% of all workers' compensation claims, and more than 13% of all claims cost in the United States.

Proper footwear protects workers against slips & falls, preventing muscle strains & sprains in other parts of the body & back injuries. Slip & fall injuries can occur in non industrial settings such as food service, hospitals & healthcare industries, & retail settings.

Slippery floors can result from snow & ice being tracked into the building, water spills & grease & other contaminant fluid spills. Poor drainage areas & irregular walking surfaces can also cause slip & fall hazards. Well documented housekeeping procedures, correct floor cleaning, proper usage of mats & signs, accessible clean up materials, and slip resistant shoes will help to minimize the risk of slipping3.

Annex II of the European Personal Protective Equipment Directive 89/686, Clause 3.1.2.1 covers the prevention of falls due to slipping, which states: "The outsoles of footwear designed to prevent slipping must be so designed, manufactured or equipped with added elements as to ensure satisfactory adhesion by grip & friction having regard to the nature or state of the surface."4

According to SATRA Technology Centre, Europe's leading research & testing center, the attributes to look for when selecting slip resistant footwear are as follows:

- Good tread pattern – on clean, dry surfaces a tread pattern is not necessary, but on lubricated surfaces an effective tread pattern is required to sweep aside lubricant in much the same was as a car tyre tread
- Flexible soles – give the wearer a good feel for the underfoot conditions, sensing slippery or loose, gravelly surfaces
- Flat sole – maximizes contact area between shoe & ground
- Low heel height – molded soles on 'sensible' shoes are idea, women's fashion shoes with separate heels become increasingly unstable as heel height

increases & top piece size decreases. Heels should be less than 30mm high with a large, broad top-piece

- High friction materials – a diverse range of rubber & plastic types is used, each in a range of formulations & hardness. Occupational footwear can only be made with a limited range of materials due to the high performance & durability requirements of the PPE standards. These materials are also used in everyday footwear along with many other materials unsuitable for occupational footwear4

Generally, EN ISO 13287 is used to certify safety, protective & occupational footwear. Safety shoes are tested & rated by SATRA to ensure a universal method for slip resistance rating. The requirements for Coefficient of Friction (CoF) for safety footwear are:

- SRA – Slip resistance on ceramic tile floor with SLS*
- SRB – Slip resistance on steel floor with glycerol
- SRC – Slip resistance on ceramic floor with SLS* & on steel floor with glycerol

*SLS = Sodium Lauryl Sulfate solution Once tested & certified, the 'CE' mark is applied to footwear products. These ratings will be stamped in the shoe or on the label, helping you select the most applicable slip resistant shoe for your environment. Shoes with the SRC rating are the most stringent specification.

Whether the risks at your worksite include heavy or sharp objects, corrosive chemicals, slippery floors or exposure to electricity, no work environment is free of hazards to the feet. Wearing the proper protective footwear for the job can help prevent damaging injuries. Ensure you understand the hazards at your site, so you can proactively take the right steps for safety.

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